

Managing Engineering Activities for the Plateau Remediation Contract - Hanford

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management



U.S. DEPARTMENT OF
ENERGY

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ABSTRACT

In 2008, the primary Hanford clean-up contract transitioned to the CH2MHill Plateau Remediation Company (CHPRC). Prior to transition, Engineering resources assigned to remediation/Decontamination and Decommissioning (D&D) activities were a part of a centralized engineering organization and matrixed to the performing projects. Following transition, these resources were reassigned directly to the performing project, with a loose matrix through a smaller Central Engineering (CE) organization. The smaller (10 FTE) central organization has retained responsibility for the overall technical quality of engineering for the CHPRC, but no longer performs staffing and personnel functions. As the organization has matured, there are lessons learned that can be shared with other organizations going through or contemplating performing a similar change.

Benefits that have been seen from the CHPRC CE organization structure include the following:

1. Staff are closely aligned with the “Project/facility” that they are assigned to support
2. Engineering priorities are managed to be consistent with the “Project/facility” priorities.
3. Individual Engineering managers are accountable for identifying staffing needs and the filling of staffing positions.
4. Budget priorities are managed within the local organization structure.
5. Rather than being considered a “functional” organization, engineering is considered a part of a line, direct funded organization.
6. The central engineering organization is able to provide “overview” activities and maintain independence from the engineering organizations in the field.
7. The central engineering organization is able to maintain a stable of specialized experts that are able to provide independent reviews of field projects and day-to-day activities.

INTRODUCTION

Corporate management of engineers has traditionally been done one of two ways. The two types of engineering organizations are:

1. A fully Centralized Engineering (CE) organization, with the majority of the engineering staff matrixed to the projects/facilities. (used by the prior Hanford prime contractor)
2. A small centralized engineering organization with the majority of the engineering staff assigned directly to the projects/facilities. (used by the CHPRC)

Each approach has its advantages and disadvantages. The purpose of this paper is to explain how deployment of a small Central Engineering organization has been successfully implemented at the Hanford Site.

The Department of Energy (DOE) Hanford Site Mission has changed over the past twenty years. The Site has transitioned from being a key component of the Nuclear Weapons production complex to being an Environmental clean-up site. Throughout most of Hanford's operating history, including this transition period, the engineering organization structure has remained essentially unchanged. Hanford prime contract engineering organizations have traditionally been a part of a central engineering organization, with support staff matrixed to the operating reactor/processing facility. The senior Engineering Manager has had direct line responsibility through an organization independent of the operating reactors/facilities. The primary differences historically have been whether or not the Engineering Manager was a direct report to the Chief Operating Officer (COO) or part of an Engineering, Procurement/Project Management, Construction organization that reported to the COO.

Due to the increased role of Decontamination and Decommissioning (D&D) activities on the Hanford site, as compared to operation of nuclear chemical processing facilities, traditional design and process engineering activities have been significantly curtailed or eliminated. i.e. the skill mix of engineers has changed from needing engineers with strong design and process operations skills to engineers possessing D&D/deconstruction skills. Attempts at implementing a graded, streamlined centralized approach were met with resistance by the various Vice Presidents responsible for day-to-day operation due to their perceived "lack of complete control" of engineering resources and priorities. The CHPRC contract proposal realigned the engineering resources to be a part of the field projects. A comparison between the prior contractor centralized, functional engineering approach and the CHPRC approach highlights the benefits that have been seen by the CHPRC for the accomplishment of the Hanford clean-up mission.

PRIOR CONTRACTOR APPROACH (Fully Staff Centralized Engineering Organization) Description – Central approach

Previous Hanford Prime Contractors assigned engineering resources to a central organization and "matrixed" the engineers to the Projects. Engineers and engineering managers primary reporting chain was through the central engineering organization. In the traditional Hanford organization, central engineering organization roles and responsibilities included establishing expectations related to roles and responsibilities and the overall management of engineering resources. Establishing expectations included the development, dissemination, and "enforcement" of

engineering policies and procedures. The central engineering organization was responsible for personnel selection, personnel management, and personnel performance. Day-to-day priorities were coordinated through the assigned facility Project/Operations management.

Advantages to this approach included:

- Consistency in engineering expectations/performance – all engineers worked to the same standards
- Engineering is independent of Operations. i.e. Engineering staff have the real or perceived independence to ensure that technical issues are fully and completely addressed without “production pressure.”
- Flexibility - Engineering had the ability to effectively and efficiently reassign engineering resources to the highest priority tasks i.e. looking at the big picture to ensure that resources are optimally assigned amongst projects

Disadvantages to this approach included:

- There were potential conflicts with project priorities
- Engineering influence over project/facility organizations was diminished. Engineers were not always viewed as an equal part of the “team”.
- Engineering’s perception of facility priorities was not always viewed the same as the assigned Project, leading to conflict
- CE occasionally chose to reassign resources based on perceived/real overall company priorities that may have been different than an individual project, leading the project that resources are drawn from to feel disenfranchised and undersupported. i.e. the Project felt that they were not in full control of their own destiny in achieving assigned goals and commitments when resources were reassigned.

CHPRC APPROACH (Small Centralized Engineering Organization)

The engineering organization in the CHPRC Engineering, Project Management and Construction (EPC) organization consists of a small, local home office Central Engineering (CE) organization (< 15 engineers), with the majority of the engineering resources (~350) being allocated to satellite engineering organizations located at each specific project site location. Each of the satellite engineering organizations has a home office connection, typically through a discipline specific lead. E.g. Mechanical Engineers in the field are matrixed to the home office lead company mechanical engineer. CE Discipline Leads and the CHPRC Chief Engineer also have “reach-back” to CH2MHill corporate resources through the Nuclear Business Group (NBG). Similar to the CHPRC CE, the NBG /Central Engineering organization is composed of an NBG Chief Engineer, Discipline Lead Engineers, and engineers matrixed to projects in the field.

The CHPRC CE organization is responsible for the development of engineering policies and procedures. CE has developed a full suite of engineering procedures for the CHPRC activities. Although many of the procedures are similar to those used by the previous contractor, new procedures have been developed and implemented explicitly for Engineering during Construction Projects. These procedures describe in detail the process for developing functions and requirements, conceptual design, preliminary design, design reviews, design reports, drawing format, configuration management during construction, and project turnover. Many of

the new documents directly implement the requirements of DOE O 413.3A, *Program and Project Management for the Acquisition of Capital Assets* [1], DOE O 420.1B, *Nuclear Safety* [2] and DOE-STD-1189, *Integration of Safety into the Design Process* [3].,

The CHPRC CE has played a major role in the management of construction project design preparation and design reviews. CE staff have provided independent discipline specific design reviews for high visibility, fee bearing, legally binding (Federal Facility Agreement and Consent Order—informally known as the Tri-Party Agreement [4] due to the 3 signatories—The Department of Energy, the Environmental Protection Agency, and the Washington State Department of Ecology) projects as well as small infrastructure projects (including the installation of over 180 mobile offices) in support of American Reinvestment and Recovery Act (ARRA) projects. Additionally, CE staff have chaired several independent Design Reviews and authored a formal design review report for each of the formal design reviews.

Four independent field project organizations maintain full management of day-to-day engineering assignments. Each of the four organizations (D&D, PFP, Soil and Groundwater Remediation, and Waste and Fuels Management) contributes to the CHPRC goal of waste retrieval, D&D, and/or groundwater remediation. Engineers in the field support a variety of tasks, including:

- Minimum safe/base operations
- Safety System management
- New construction design support
- New construction field support
- D&D support
- Operating facilities support
 - Work documents
 - Engineering documents

Resources are assigned on a daily basis based on each individual Project's priority list, contractual commitments, and resources pool. Enabling the projects to have direct control of the resources has assured that engineering day-to-day priorities are aligned with the individual project priorities. This has enabled individual projects to make significant progress utilizing ARRA funding.

Because the individual project engineering organizations operate somewhat autonomously, there is the potential for each of the organizations to have slightly different interpretations and implementation of engineering procedures, policies, and practices. To minimize this potential, the CE organization maintains regular contact with the field engineers. CE Discipline specific engineers spend time "on the projects" meeting with engineers, performing assessments, performing surveillances, and providing oversight of work activities, taking lead roles in large construction project design reviews, and chairing discipline specific "Centers of Excellence (COE)" that meet on a periodic basis. Additionally, the CHPRC Chief Engineer has a monthly Engineering Leadership Meeting with the Project Chief Engineers and the Central Engineering Discipline Engineers.

During D&D of a facility where the equipment is being 100% removed and/or the facility is being reduced to “slab-on-grade”, staff assignments are fluid and flexibility to manage/move staff needs to be done at the lowest organization level possible. With engineering decentralized, the “owning project” has the flexibility to assign staff based on the project/facility priority of the moment. The disadvantage is that there is no single organization looking at the overall company priorities in the assignment of resources and there may be times when a higher priority project is “understaffed” and engineering resources are “stretched” while at the same time a lower priority project has resources that are “comfortable” in their work load.

For example, one of the four projects has experienced a shortage of qualified engineering personnel as staff members have “posted” to other projects. Rather than developing and recruiting new engineers into the company, individual project organizations have found that it is often easier to “attract” engineers from other internal organizations. Obtaining an engineer from another CHPRC engineering organization reduces training time and recruiting costs. This has, however, left the vacated organizations struggling to identify contract personnel to backfill the vacated positions. Negotiations to stem the exodus have been elevated to the Executive Vice President/COO. With a strong centralized organization, staffing assignments could have been handled by the company Chief Engineer.

Practices put into place to overcome the “cons” of the Project approach include:

- Each discipline, at the CE level, has a COE (e.g. Engineering Leadership Team, Welding COE, HVAC COE, Electrical Codes Board)
- CE engineers are encouraged to “get out” to the field. I.e. get to know the field engineers
- CE engineers have broad expertise and communication skills
- CE has significant pull-back expertise through CH2MHill and partner corporate teams
- CE has Codes and Standards pull-back through CH2MHill and partner corporate teams
- CE has technology pull-back through CH2MHill and partner corporate teams
- For EPC managed projects, CE has final design approval
- CE chairs monthly meetings with the Project Chief Engineers, in addition to regular informal interactions.

Central Engineering Organization Unique to the PRC

Other functional organizations within the CHPRC are organized somewhat differently than the CE organization. Most other functional organizations are a part of either the Safety, Health, and Quality (SH&Q), Environmental, or Business Processes organizations. The SH&Q and Environmental organizations are structured similar to the “Hanford Historical” engineering organization in that the staff members are assigned to a central functional organization and matrixed to the individual projects. Business Process organizations are composed of central and project staff members; the central staff members provide overall company business strategic planning and interface with the Department of Energy, whereas the staff assigned to the projects provide Earned Value Management System (EVMS) and day-to-day financial support. Central Engineering, in contrast, consists of a small centralized engineering organization that is a part of the Engineering, Project Management, and Construction organization. The majority of the engineering staff are assigned to the Projects. The unique requirements for technical independence lend the Central Engineering organization to the different organization structure.

SUMMARY

The CHPRC CE organization has evolved during the first 2 years of the CHPRC contract. From the contract transition period in August/September/October 2008 until now, the organization has continued to assume responsibilities in support of the Hanford Clean-up. With the addition of ARRA funding, CE primary responsibilities for day-to-day overview shifted to Project support for the many ARRA funded design/construction projects that have been initiated, are in progress, and/or have been completed during this time period. During this period, the CHPRC CE organization has developed new policies and procedures to ensure the implementation of a disciplined approach to engineering. Members of the CHPRC CE organization have also assumed new responsibilities that help to assure consistency in the implementation of construction project and day-to-day engineering. The new responsibilities include the creation of discipline specific Centers of Expertise, and membership on company level oversight committees (e.g. Hanford Site Electrical Safety Board, Joint Evaluation Team, Hanford Concerns Council) that have enabled the CE organization to influence the implementation of consistent, disciplined engineering across the CHPRC.

The result has been an energetic, “lean” central engineering organization that is well fitted to the CHPRC D&D and clean-up mission.

REFERENCES

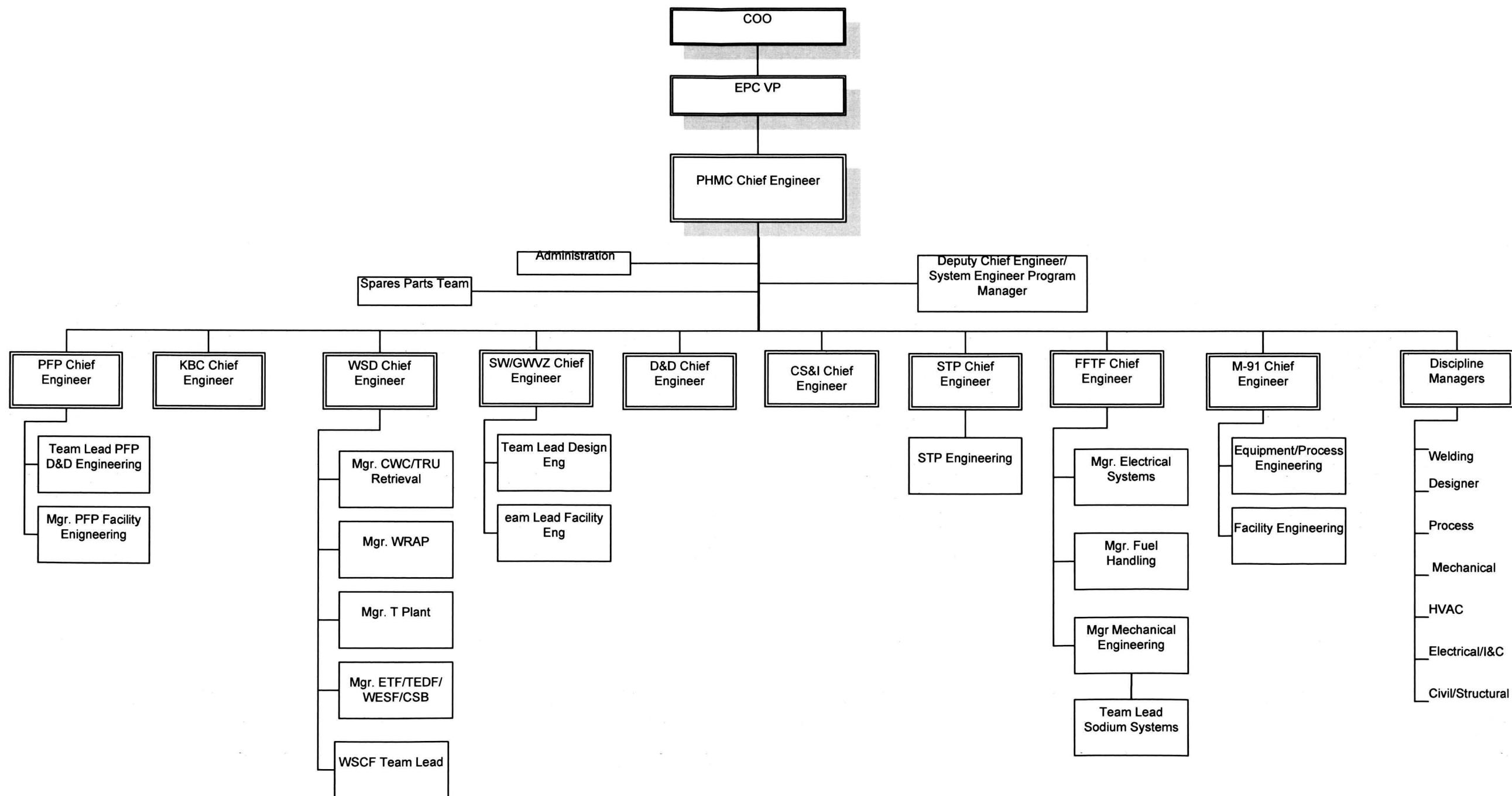
1. DOE O 413.3A, *Program and Project Management for the Acquisition of Capital Assets*
2. DOE-STD-1189, *Integration of Safety into the Design Process*
3. DOE O 420.1B, *Nuclear Safety*
4. Federal Facility Agreement and Consent Order (aka the Tri-Party Agreement)

ATTACHMENTS

Attachment 1: Prior Contractor Central Engineering Organization Chart

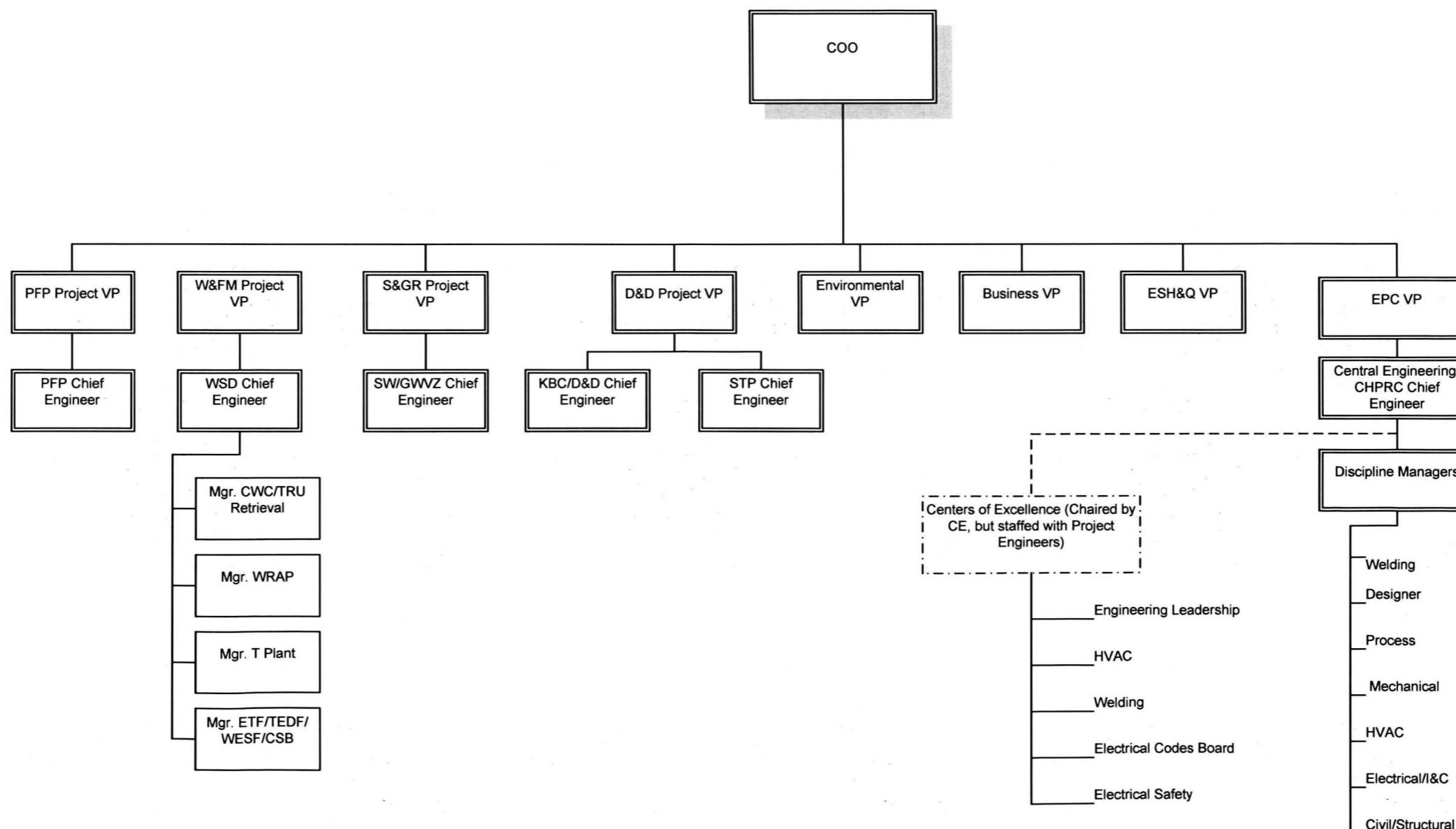
Attachment 2: CHPRC Central Engineering Organization Chart

Prior Contractor Hanford Central Engineering



CHPRC

Central Engineering



Attachment 2