DOE/MA-0040

COST & SCHEDULE CONTROL SYSTEMS CRITERIA FOR CONTRACT PERFORMANCE MEASUREMENT

WORK BREAKDOWN STRUCTURE GUIDE

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ASSISTANT SECRETARY,
MANAGEMENT
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DISCLAIMER

FOREWORD

Utilization of the Work Breakdown Structure (WBS) technique is an effective aid in managing energy systems acquisitions. The technique provides the framework for integrating the contractor's management control systems and assists both DOE and the contractor in fulfilling their management responsibilities.

This document provides guidance for use of the WBS technique for work identification and definition. It is the fourth in a series of CSCSC guidance documents. The others are the DOE/CR-0014 "Summary Description", August 1979; DOE/CR-0015 "Implementation Guide", May 1980; and DOE/CR-0017 "Contractor Reporting/Data Analysis Guide", November 1980. Detailed guidance on Systems Review/Surveillance will be provided in a subsequent guide.

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CHAPTER I - INTRODUCTION

A. PURPOSE

This document provides guidance on development and use of the Work Breakdown Structure (WBS) technique. It describes the types of work breakdown structures, their preparation, and their effective use for organizing, planning, and controlling projects and contracts managed by the Department of Energy (DOE).

The WBS technique is the preferred management tool for identifying and defining work. It provides an ordered framework for planning and controlling the work efforts to be performed in achieving technical objectives and for summarizing data, and the quantitative and narrative reports used for monitoring cost, schedule and technical performance.

A WBS is developed by first identifying the major end items or systems to be produced, followed by their successive subdivision into increasingly detailed and manageable subsidiary products. Most of these subsidiary products are the direct result of work, while others are simply the aggregation of selected products into a logical set for management control purposes. In either case, detailed tasks are eventually identified for each product on the WBS at the level where work will be performed. As a minimum, these detailed tasks or work packages identify the product, describe the effort to be performed, identify the resources to be applied, specify the budget and schedule constraints, and the technical requirements, and identify the organizational element responsible for work accomplishment.

B. SCOPE

These WBS guidelines are to be used for varied work efforts such as research, development, construction, demonstration, test and evaluation, operation and production of major end items and products. The products of these efforts may be hardware, software or services, or any combination thereof. Program and Project Managers should determine the technique's applicability. In accordance with DOE Order 5700.4, Project Management System, a WBS is mandatory for DOE major systems acquisitions and major projects, and will be used for other projects to the extent practicable. A WBS is also required when the DOE Cost and Schedule Control Systems Criteria (CSCSC) are applied on contract.

Reference documents that describe policy for the management of DOE work and are pertinent to the use of the WBS technique include:

- OMB Circular A-109 - Major System Acquisitions
- DOE Order 5700.1A - Major System Acquisitons
- DOE Order 5700.3 - Major System Acquisition Procedures

- DOE Order 5700.4 - Project Management System
- DOE Order 4240.1A - Designation of Major System Acquisitions
- DOE Order 2250.1 - Department of Energy (DOE) Cost and Schedule Control Systems Criteria for Contract Performance Measurement
- DOE Order 1332.1 - Uniform Reporting System For Contractors

CHAPTER II - WBS DEFINITIONS

A. WBS TERMINOLOGY

To apply the WBS concept effectively, it is essential that WBS preparation and use be fully understood. The following definitions are sequenced to facilitate understanding of how a WBS is developed. A more detailed explanation of preparation and use of a WBS follows in Chapters III and IV.

1. Work Breakdown Structure

A WBS is a family tree hierarchy of the products requiring work to be performed in accomplishing the end objective. Unlike a genealogical family tree, however, the products on the lower branches are produced earlier in time than those above. Products that result from work efforts may be hardware (facilities, reactors, steam generators, etc.), services (facility operation, test and evaluation, project management, etc.), and data (technical reports, engineering data, management data, etc.). A WBS serves as a bridge between the end objective and its supporting efforts. It depicts work products in the manner in which the work is to be accomplished and provides the conceptual framework for planning and controlling the work. Figure 1, page 4, illustrates a typical WBS.

2. WBS Element

The individual products specified in the WBS are termed WBS elements. Each element is a discrete portion of the WBS, comprising either an item of hardware, service, or data. The WBS includes all the elements necessary to achieve the end objective.

3. WBS Level

The hierarchical location of the various WBS elements is identified by a level designation. The WBS family tree places subproducts on a level below a product level. Each element at the same stage of subdivision is said to be at the same WBS level. Descending levels provide increasingly detailed definition of the end item product. The number of levels depends on the scope and complexity of the individual project and the degree of control it warrants. The top three levels of the WBS for a project would be typically subdivided as follows:

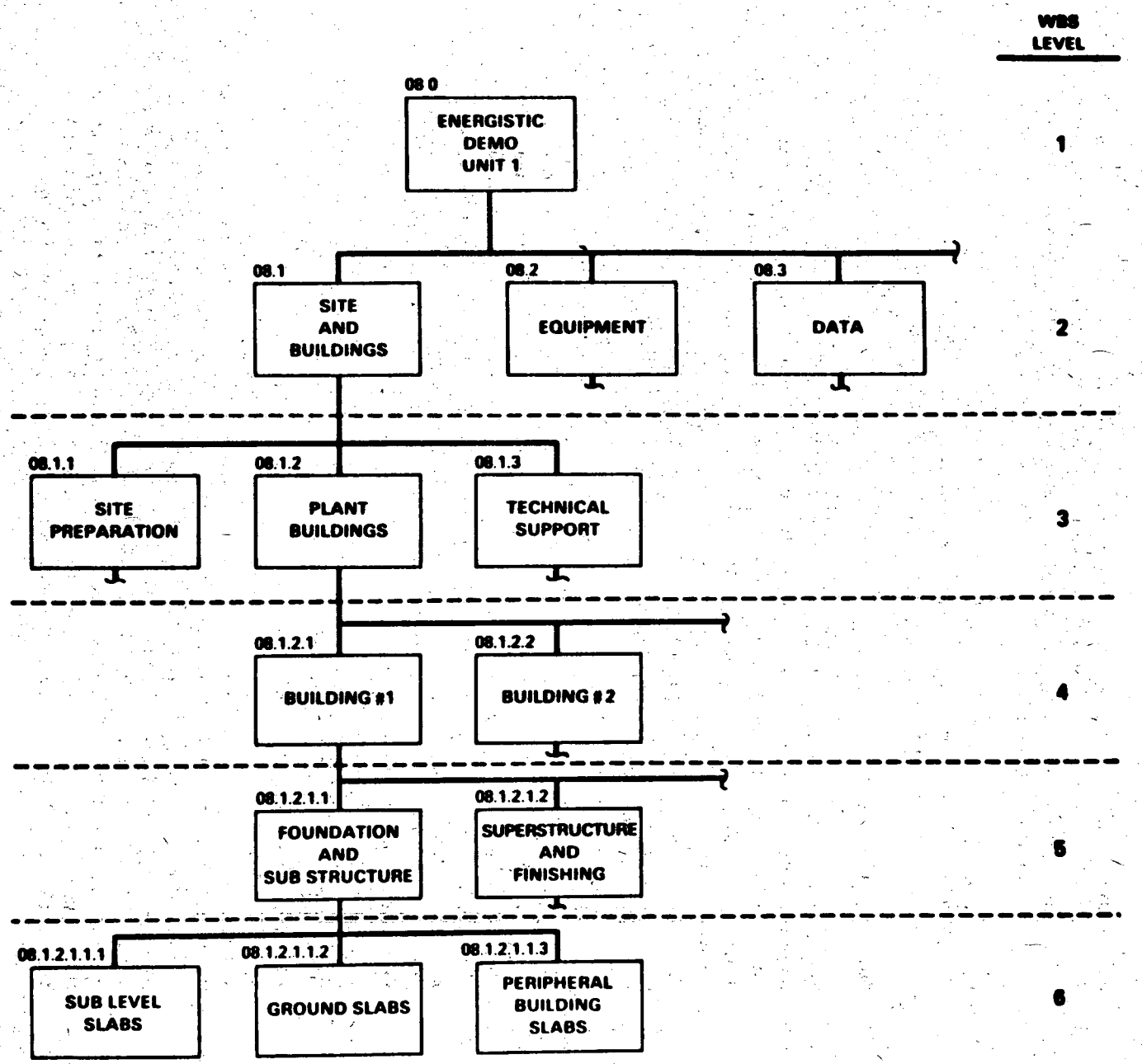


FIGURE 1 TYPICAL WORK BREAKDOWN STRUCTURE

a. Level 1
Level 1 contains only the quantified project objective or end item to be accomplished. The product at this level should be identifiable directly to an element of the DOE Budget and Reporting (B&R) Classification Structure.*

b. Level 2
Level 2 contains the major product segments or subsections of the end item. Major segments are often defined by location or by purpose served.

c. Level 3
Level 3 contains definable components, or subsets, of the level 2 major segments.

4. Summary WBS

The Summary WBS serves as the starting point for WBS preparation. A Summary WBS illustrates a general hierarchy of systems, subsystems and supporting elements that provide a basis for developing a specific Project Summary WBS. Attachment A includes Summary WBSs for guidance in preparing the Project Summary WBS for a Research Project, System/Plant/Facility Project, or Software Project.

5. Project Summary WBS (PSWBS)

The PSWBS evolves from a Summary WBS through application of unique project requirements. It will usually consist of three levels of work definition and will be used as a basis for subsequent contractor support. A PSWBS may need revision to reflect logical development of the lower levels during contract performance. Changes at all levels must be subject to formal change control procedures. Attachment B includes a typical WBS for a Nuclear Generating Plant, a Test Facility, a Component, and an Operations and Maintenance Project.

6. Contract WBS (CWBS)

The CWBS is constructed in a manner consistent with the requirements specified in the contract and depicts the products or services to be furnished. The preliminary CWBS includes the PSWBS elements selected by the DOE Project Management for support by a specific contractor (e.g., an engineering firm or constructor). The subsequent extension by the contractor of the selected elements that uniquely define the lower level products and associated tasks culminate in the CWBS. Normally, a CWBS is extended to the CSCSC cost account or comparable management control level. The contract reporting requirements will indicate the CWBS levels or elements at which costs are to be

* Budget and Reporting classifications are prescribed by DOE for the formulation of budgets, for the reporting of obligations, costs and revenues, and for the controlling and measuring of actual versus budgeted performance.

reported to DOE. A CWBS provides a consistent and visible framework that facilitates uniform planning, assignment of responsibilities, and reporting of status.

7. Project WBS

The Project WBS is a combination of the PSWBS and each supporting CWBS. It contains the product elements that will be designed, constructed, tested, and supported, etc. to meet project objectives. The CWBS elements are included in the Project WBS only to the level significant to the DOE Project Manager.

8. Program WBS

A Program WBS would be a WBS developed above the project level, and would be an aggregation of projects and other products which are assembled in a manner to facilitate overall program control. Frequently at this level the B&R Structure will suffice for a Program WBS. Use of the B&R Structure minimizes the complexity of summarizing management information and facilitates data traceability. This guide primarily addresses use and application of the WBS technique at the project and contract level. A Program WBS should be developed using the guidance contained herein for projects.

B. WBS CODING

Each WBS element is assigned a code to be used for its identification throughout the life of the project. A simple decimal or alphanumeric coding system is applied that logically indicates the level of an element and relates lower level supporting elements to their parent upper level element. Through extension of the coding system, work packages can be related to the WBS elements they support and other cost segregation objectives may also be supported. Figure 1, page 4, illustrates a typical coding system that is easily traceable from Level 1 to Level 6. Where possible, the first number in the WBS code should be related to the DOE B&R Classification number. On Figure 1, for example, Energistic Demo Unit 1, coded 08.0 is an extension of, and is traceable to B&R number AM 15 25 08. The CWBS coding system must directly relate to the PSWBS coding system. If this is not possible, a coding interface conversion system is required.

C. WBS DICTIONARY

The WBS Dictionary lists and defines the WBS elements. It should be prepared initially by DOE Project Management and then expanded by supporting contractors. It consists of two parts. Part I is an index which lists WBS elements extended in accordance with the guidance contained herein. Part II contains individual entries to describe each WBS element and the effort associated with it. The WBS Dictionary should be revised to reflect changes and should be maintained in a current status throughout the life of the project. Attachment C contains an example WBS Dictionary, Parts I and II (Forms DOE-142A and 142B respectively), with instructions for preparation.

CHAPTER III - PREPARATION OF A WBS

A. INTRODUCTION

DOE Project Management is responsible for developing the complete task structure and element definition for all project related work. Based on the project objective and appropriate Summary WBS elements, Project Management first prepares the preliminary PSWBS. They then develop the preliminary CWBS required for each planned Request for Proposal (RFP). In coordination with DOE Project Management, the contractors responding to an RFP modify the preliminary CWBS to develop the proposed CWBS for the work required by their proposal. The successful contractor's proposed CWBS is subject to negotiation with DOE. After negotiation Project Management integrates each approved CWBS with the PSWBS to obtain the Project WBS. The responsibilities for WBS activities are summarized in Figure 2, below. The evolution of a Project WBS is depicted in Figure 3, page 8. Work Breakdown Structures may be represented in many ways, but for maximum usefulness should be illustrated in the manner shown in Figure 1, page 4, and prepared in WBS Dictionary format.

WBS ACTIVITY	RESPONSIBILITY	
	DOE	CONTRACTOR
1. Preliminary PSWBS Prepared	X	
2. PSWBS Elements Selected for Preliminary CWBS and included in Solicitation	X	
3. Preliminary CWBS Extended and Proposed Changes Submitted in Response		X
4. Evaluation Conducted by Source Evaluation Board	X	
5. Contractor Selected and Contract Negotiated (Including Changes to CWBS, if any)	X	X
6. Contract Awarded, CWBS Approved	X	
7. PSWBS Revised to Include Approved Changes	X	
8. Project WBS Prepared	X	
9. CWBS Maintained/Changes Submitted		X
10. Changes Approved as Necessary	X	
11. Project WBS Maintained	X	

FIGURE 2 ACTIVITIES AND RESPONSIBILITIES

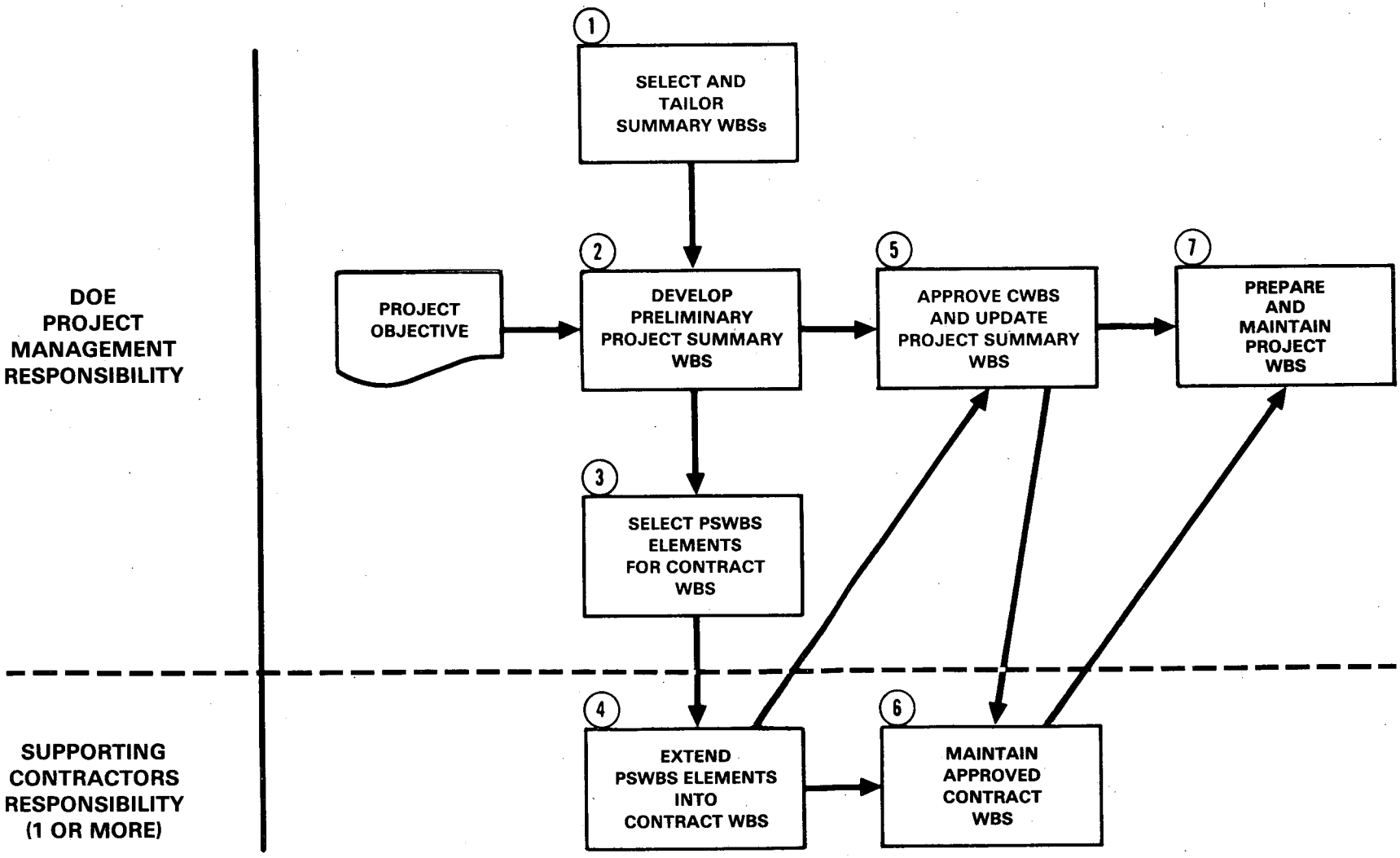


FIGURE 3 EVOLUTION OF THE PROJECT WBS

B. GENERAL GUIDANCE

The preparer of a WBS should keep in mind that the WBS is product oriented, i.e., its elements should be hardware, services, or data. Test Facility, for example, is a product, but Title I Design, Mechanical Engineering, Piping Labor, and Direct Costs are not. Title I Design describes a phase in the project's life, Mechanical Engineering and Piping Labor are disciplines involved in producing a product, and Direct Costs describe a cost element or an accounting classification. Coding of the work for such categories and others, and assignment of appropriate charge numbers by contractors, will permit summarization of data in any needed manner, but product control is primary. The emphasis on a product-oriented WBS results from the way a contract is written, funded, scheduled and controlled. When DOE awards contracts associated with projects, it is contracting for products, such as facilities, services, and data and not for phases, functions, or accounting classifications. Also the line items in the DOE budget authorizing the project will reflect products. Therefore, a product oriented WBS is a natural outcome of these processes and facilitates project control.

C. PROJECT SUMMARY WBS (PSWBS)

The first prerequisite to the preparation of the PSWBS is the clear understanding and statement of the project objective, the delivery of a specific major end item or end product. Once this overall project objective is established, it assists in determination of project subobjectives. These subobjectives interact to support the overall project objective in the same manner that subsystems support a total system capability. DOE Project Management should identify subobjectives by careful analysis of the overall project objective. This process of identification and definition of subobjectives assists in structuring the contributing elements during WBS preparation.

Assessing such information led to the development of the Project Summary WBS for a Fuel Gas Plant Project shown in Attachment D. The attachment contains the project background, including a brief description of the project, its objectives, the demonstration plant to be constructed and operated, and the organization, roles, and responsibilities of the participants. A flow chart illustrates the fuel gas production process to be performed by the completed plant. The resulting WBS depicts a logical summarization of the facilities, systems, and services required to build the plant.

Early in project planning DOE Project Management should select the Summary WBS(s) that will best assist in preparing the preliminary PSWBS (Figure 3, page 8, box 1). The Summary Work Breakdown Structure elements should be used as guides and may be added to, deleted, or changed as required to reflect the unique needs of the particular project. Differentiation of Project Specific Equipment at Level 3 enables use of

the Summary WBSs in Attachment A for development projects such as an Energy Search System, Energy Transportation/ Distribution System, Energy Extraction System, Energy Conversion System, Energy Utilization System, or Energy Storage System.

The PSWBS should be used to identify work for proposed supporting contracts. The preliminary PSWBS is based on the overall project objective and subobjectives and is prepared with the aid of a tailored Summary WBS (Figure 3, page 8, box 2). Normally, the PSWBS contains the top three levels only. Lower level elements may be included when necessary to clearly communicate all project requirements.

Care should be taken to assure that the PSWBS represents common identification and definitional needs of the various functions involved with Project Management (i.e., Construction, Procurement, Engineering, Project Control, etc.), since the PSWBS is used to specify contract work supporting the project. Subsequently, the PSWBS elements assigned to contractors are extended by the contractors to derive each CWBS. Together, the PSWBS and each CWBS constitute the Project WBS which then provides the framework for cost, schedule and technical planning and control through the life of the project.

The WBS development process is iterative. The preliminary PSWBS is not intended to be rigid and may be revised. Changes may occur when it is determined that the work effort can be more accurately defined or that a revised approach (e.g., technically different or more cost effective), should be taken to satisfy or meet the project objective. Also, contractors, while developing their CWBS, may propose to DOE alternative approaches to better accomplish the contract objectives. If the alternatives are accepted by DOE Project Management, the preliminary PSWBS will be revised accordingly.

D. CONTRACT WBS (CWBS)

1. Solicitation

Only one WBS is used in each Request for Proposal (RFP) and ensuing contract. DOE Project Management structures a preliminary CWBS by selecting the appropriate lower level PSWBS elements to be included in the RFP (Figure 3, box 3). The elements selected should permit maximum flexibility to prospective contractors in preparing their proposals.

Normally, the preliminary CWBS developed by DOE Project Management should not contain more than three levels. If detail levels are added below the third level, a contractor's organizational structure may be affected and the contractor's normal method of operation may

be hampered. The RFP should instruct contractors to extend the preliminary CWBS to as low a level as necessary to identify and structure the work effort to achieve the contract purpose (Figure 3, page 8, box 4). Contractors may suggest changes to the selected PSWBS elements when a change is needed to meet an essential requirement of the RFP or to enhance the effectiveness of the CWBS in satisfying the project objective.

The preliminary CWBS in the RFP should include the initial WBS Dictionary, prepared by Project Management, using the formats shown in Attachment C. Attachment E contains a clause for including the CWBS requirement in solicitations. The requirement for providing the WBS Dictionary must also be affirmed by checking the appropriate box or boxes on DOE Form 537, Reporting Requirements Checklist. (See Attachment F.)

2. Response

The content of a WBS varies by contract. As greater breadth or depth is achieved within a WBS, each element's dollar value and complexity is reduced. The number of elements in the structure is generally dependent upon the size and complexity of the effort, the degree of uncertainty, organizational structures concerned, and management's judgment of need.

When prospective contractors prepare their CWBS in response to the solicitation, the following items should be considered.

a. Operational Flexibility

The CWBS is not an end in itself. It is a tool to be used by both DOE and contractor management. As such, a contractor's management objectives and needs play a dominant role in the development of the CWBS. Prospective contractors have complete flexibility in extending the CWBS. The contractor's plans to perform the work and the manner in which work efforts are organized, managed, and reported should be reflected in the CWBS. Particular attention should be given by the proposing contractors to ensure the correlation of lower levels of the CWBS to the work statement tasks, specification tree, contract line items, configuration items, and reporting and other requirements of the contract.

b. Cost Account Development

When the CSCSC are applied, each lower level CWBS element must interface with one of the proposers' organizational elements to assure work responsibility identification. The lower levels may be configuration items, service elements, items of data, or

meaningful product or management oriented lower indentures of a higher level element. The organization and WBS levels selected for these management control points are identified by the proposers. In identifying these interfaces, the proposers must be allowed flexibility to establish these responsibilities at meaningful and appropriate levels. Otherwise, the proposers' existing management control systems and responsibility assignments may be impacted adversely.

Figure 4, page 13, illustrates organizational responsibility for CWBS elements when the CSCSC are applied. The responsibility for a lower level WBS element is assigned to a responsible organizational element to form a natural control point for accumulation of costs, control of schedules, and determination of performance. This management level for work planning and control is designated a cost account. The cost account is composed of budgeted tasks and the schedules necessary for their accomplishment.

Virtually all aspects of the contractor's management control systems come together at the cost account including budgets, estimates, schedules, work assignments, cost collection, progress assessment, problem identification, and corrective actions. Most management actions taken at higher levels are on an exception basis, and result from a review of significant problems identified at the cost account level. Performance visibility is directly relatable to the level and makeup of the cost accounts.

c. Subcontracted Products or Services

Critical products or services which are to be subcontracted should be identified and treated as individual CWBS elements. Other subcontracted work should be identified in the WBS Dictionary under the appropriate element. In either case, proposers should assure the traceable summarization of subcontractor data supporting their CWBS. Proposers may require the use of the WBS technique by subcontractors to permit fulfillment of CWBS requirements and to provide adequate control of the subcontract.

d. WBS Dictionary

A WBS Dictionary containing CWBS element definitions is required from each proposer. Each element definition should include:

- The work to be performed;
- How the work will be accomplished;

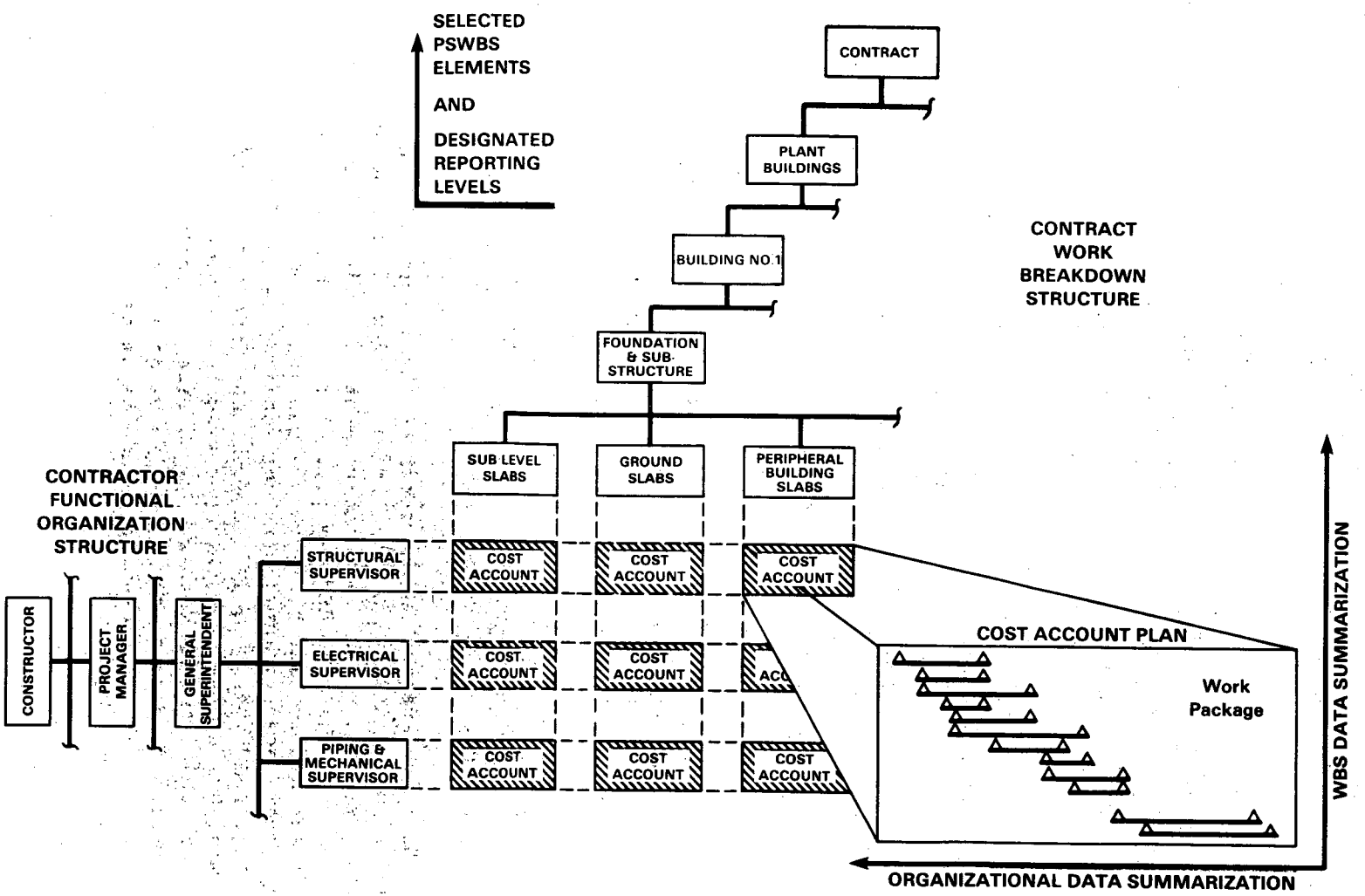


FIGURE 4 INTEGRATION OF CONTRACT WORK BREAKDOWN STRUCTURE WITH ORGANIZATION STRUCTURE

- o Who will do the work; and

- o Other significant data which further describe each CWBS element, e.g., an identifiable relationship betwen the CWBS element and a design specification.

e. CWBS Coding

The CWBS coding method used by the proposer should enable meaningful summarization of related data from the lowest to the highest levels of the CWBS. The coding structure proposed must be compatible with the project coding structure in order that contract cost and schedule performance data can be incorporated directly into project reports. (See Chapter II, paragraph B, page 6 and the example in Figure 1, page 4.)

3. Evaluation

Each CWBS submitted by a prospective contractor is evaluated by the Source Evaluation Board as part of the proposal evaluation process. Each proposer's submittal should be based on the preliminary CWBS contained in the RFP. Since this CWBS may not always be compatible with the way prospective contractors plan to organize and manage the contract work, the RFP should permit proposers to modify the preliminary CWBS.

4. Negotiation

The CWBS included in the successful proposal serves as the basis for negotiating and agreeing to an approved WBS for the contract. DOE Project Management should specify the elements for which Cognizant Contracting Officer approval will be required prior to contractor revision. Usually, these DOE controlled elements are identical to those specified for periodic contractor reporting; however, DOE Project Management should provide for special reporting, as required for analysis of problem areas on any WBS element, regardless of its level in the WBS.

The CWBS is referenced in the contract through use of the contract clause shown in Attachment E. Part I - Index, of the negotiated WBS Dictionary, should list each WBS element, including those at the cost account level when the CSCSC apply. Part II - Element, Definition may or may not include all levels depending on DOE Project Management's needs. The contractor submits the WBS Dictionary to the DOE Project Manager through the Cognizant Contracting Officer. Following DOE Project Management review and recommendation for approval, the Cognizant Contracting Officer formally approves the CWBS (Figure 3, page 8, box 5) and forwards it to the contractor. The approved CWBS provides the common denominator for communication between DOE and the

contractor on work planning, control and reporting. This CWBS provides the means for control of changes in project and contract needs. If the approved CWBS includes elements that impact the PSWBS, then the PSWBS should be revised accordingly (Figure 3, page 8, box 5).

5. Post Contract Award

The approved CWBS becomes the basis for further evolution by the contractor during the contracted effort and serves as the baseline for configuration or contract change control (Figure 3, box 6). The WBS Dictionary provides the reference required to assure that contract work and reporting are being accomplished in accordance with the approved CWBS. Processing of revisions to a CWBS varies depending on whether or not an element is classified as a DOE controlled element.

6. Project Controlled Elements

CWBS elements requiring DOE Project Management approval prior to any change are designated Project Controlled Elements. Normally, these elements are in the upper three levels of the CWBS. Elements below Level 3 should have significant cost or technical risk to be subject to DOE change control. When a project is supported by multiple contractors, Project Controlled Elements may vary by contract. As the project progresses, DOE Project Management should review the CWBS periodically to determine if elements should be added to or deleted from those subject to DOE control. All contractor proposed changes to the Project Controlled Elements must be submitted, in the form of WBS Dictionary revisions with supporting justification, to the Cognizant Contracting Officer for review and approval. Based on the DOE Project Manager's recommendations, the Contracting Officer notifies the contractor in writing of the acceptability of such changes.

Care should be exercised by DOE Project Management to assure that only essential CWBS elements are specified for DOE control purposes. This permits contractor flexibility in making changes to the remaining elements without requiring prior approval by DOE Project Management. When contractors revise an element under their control, the change is documented by an update to the WBS Dictionary and forwarded to the Cognizant Contracting Officer.

E. PROJECT WBS

DOE Project Management develops the Project WBS (Figure 3, box 7) by merging each approved CWBS, to the level considered necessary for management purposes, with the PSWBS. After review and approval by the DOE Project Manager, the Project WBS in the WBS Dictionary format should

be published and distributed to DOE organizations with defined project responsibilities and to contractor management. Changes to the approved Project WBS are recorded and a history is maintained throughout the life of the project to ensure change traceability.

F. WBS REVISIONS

WBS revisions may result from expansion or contraction of project/contract scope, the movement of a project through its various stages (e.g., research, development, construction, demonstration, and operation), and the unique needs of supporting contractors such as architect-engineers (A-E), system fabricators, and constructors. Users of this guide should understand that the sequence shown in preceding paragraphs may be iterative as the project evolves, contracts are awarded, and the work effort progresses.

CHAPTER IV - USE OF THE WBS

A. GENERAL

Since a WBS shows the relationship of all elements supporting the project, it provides a sound basis for cost and schedule control. Each level of the structure is closely related to a management sphere within the project, providing the framework for relating time and cost summaries to appropriate levels of contractor and DOE management.

At the lowest WBS level, the detailed tasks performed by the contractor's functional components are defined. These tasks can be interrelated in networks representing the flow and interdependency of work. The dynamic elements of time and cost can then be added to the structure by assigning budgets and schedules to each task. This establishes the basic time and cost yardstick for the task. As work progresses on the task and resources are employed, budget, cost, and schedule data are reported, along with any revised future estimate. The task data are then summarized to provide successive levels of management with the appropriate report on current and predicted status of the work for which they are responsible. Management will thus be better able to maintain an awareness of current status and to apply their efforts to assure desired performance.

B. MANAGEMENT CONTROL

A Project WBS provides a basis, and an integrating mechanism, for managing key functions such as planning and budgeting, funding, estimating, scheduling, and performance measurement. WBS identification can be used in each of these functions to form a common basis by which they can be related to specific work activity, to project objectives, and thus to each other. Use of the WBS to support management control is described in the following sections.

1. Planning and Budgeting

The WBS technique assists management in the planning and budgeting functions by providing a formal structure which identifies all the products and relates all the work effort required to meet the project objective. By breaking the total product and effort into successively smaller entities, management can ensure that all required products are identified and addressed. Furthermore, management can verify that all work identified to the WBS, and hence charged to the effort, actually contributes to the work objective. In addition, a WBS simplifies the summarization of contract and project data for planning and budgeting purposes. The planning of work by WBS elements serves as the basis for scheduling and budgeting resource requirements. Aggregation of the element resource needs, according to their relationship in the WBS, leads to total project budget requirements. Subsequently, the assignment of the budgets to scheduled segments of contract work produces a time-phased plan against which actual performance can be compared and appropriate

corrective action taken when performance deviates from plan. Figure 5, page 19, illustrates work, schedule and budget integration.

2. Funding

A WBS can be used in developing the project funding requirements. The information derived from WBS performance reporting and projections can assist in establishing, justifying, and allocating project funds for the next fiscal year and future fiscal years. Since the work and cost content, management priority, and status of each WBS element is defined, a baseline exists for planning, controlling, and accounting for project funds.

3. Estimating

Cost estimating at the project and contract levels is facilitated by use of the WBS technique. This technique provides a systematic approach to cost estimating that ensures relevant costs are not omitted. An estimate derived by WBS element helps DOE Project Management to monitor, coordinate, and control the various project activities that DOE and the contractors are conducting.

a. Historical Data Base

Cost information by WBS element can be used in estimating costs for pricing and negotiating contract changes and for follow-on procurements. In the long run, DOE can accumulate a cost data bank of similar WBS elements from different projects. Such historical cost data can be used in estimating the financial requirements for like elements of new projects. For these new projects, a WBS can provide the framework for the estimating process. Subsequent performance data collection by both the contractor and DOE Project Management can be compared to the original estimates to establish their validity, to identify trends, and to re-estimate future project needs.

b. Construction Estimating

For projects involving construction, project cost estimates are developed periodically. Each succeeding estimate is made in an attempt to forecast more accurately the project's final total cost. Basically, the estimates fall into two categories (phase estimates and contract estimates) which support DOE Project Management on-going efforts in preparing budgets, evaluating contractor performance and updating the project's total estimated cost.

As a construction project moves through its various phases, the estimate for the next phase in the cycle provides the basis for reassessment of the project's total estimated cost. This

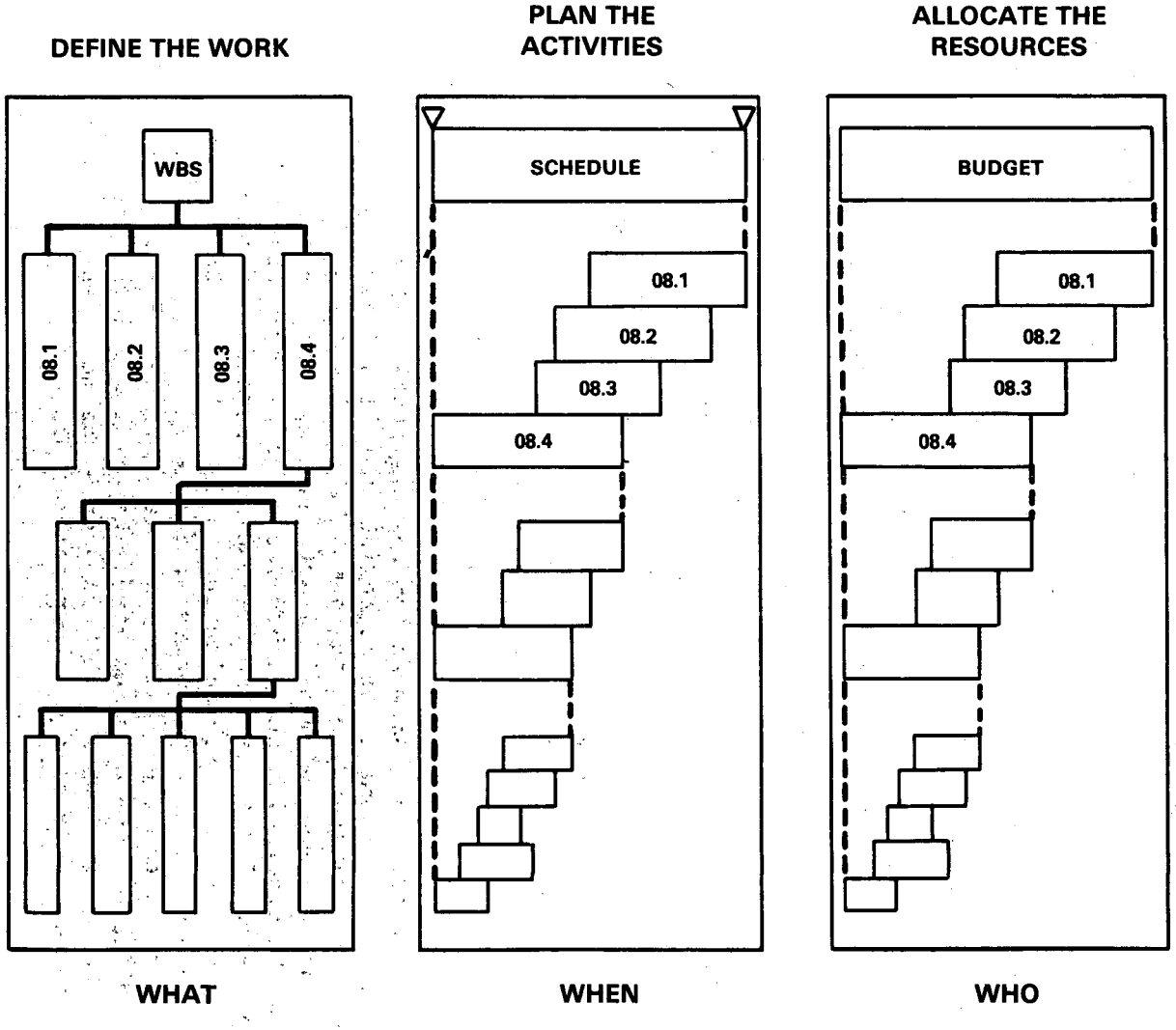


FIGURE 5 WORK - SCHEDULE - BUDGET INTEGRATION

action, in turn, establishes the basis for contract negotiation with participants for the next phase. For example, the initial construction estimate is developed by the architect-engineer (A-E) upon completion of the definitive design phase. The constructor, and other designated participants, also prepare a construction estimate based on the definitive design. It is mandatory that each estimate be based on a consolidation of each approved CWBS and that all concerned understand the methodology used by the A-E in developing the initial estimate. Each contractor CWBS is not identical and any differences must be accommodated and reconciled to obtain valid, comparable estimates from the involved contractors.

Figure 6 illustrates the situation where an A-E and a constructor use a CWBS unique to their function. Each CWBS starts at level 1 with WBS element 200, Total Plant, but from there they diverge. At the second level the A-E has four elements, while the constructor has only two elements. At the third level the A-E has fifteen elements, while the constructor has six elements. The difference results from the A-E's treatment of BOP Mechanical and Electrical Systems as separate level two elements, while the constructor considers the systems to be components of NSSS Buildings and BOP Buildings and Facilities.

Historically, A-Es have estimated by system, while constructors have estimated by building, establishing the need for reconciliation. It may be necessary for DOE Project Management to introduce uniformity into the estimating process to facilitate comparison between the two estimates and derive the DOE Project Management estimate for construction. This may require definition of distributable cost categories, and distribution of systems costs to particular buildings.

4. Scheduling

The WBS affords a framework for the aggregation of schedule information by WBS elements to establish overall and detailed schedules. The impact of schedule changes may be readily assessed when a WBS is used because each element's start and completion date is integrated with the other elements' schedules. This allows expedited review and approval by DOE Project Management of contractor proposed schedule changes. Periodic schedule reports for selected WBS elements, complete with variance analyses, can be required of contractors. In contracts where the CSCSC are applied, the Cost Performance Report and Milestone Schedule and Status Report fulfill this requirement. (See DOE Order 1332.1). DOE Project Management can use these reports to monitor progress and to control the project.

Level	Number	ELEMENT TITLE	
		Architect-Engineer	Constructor
1	200	Total Plant	Total Plant
2	201	Site & Buildings	Site & Buildings
3	201.1*		
3	201.2	NSSS Bldg. & Structures	NSSS Building
3	201.3	BOP Bldg. & Structures	BOP Bldg. & Facilities
3	201.4	Overall Plant Systems Integration	
3	201.5		Construction Inventories
3	201.6		Construction Facilities
2	202*		
2	203	BOP Mechanical & Electrical Systems	
3	203.1	Primary Systems	
3	203.2	Auxiliary Systems	
3	203.3	Instrumentation & Control	
2	204	NSSS Mechanical & Electrical Systems	
3	204.1	Reactor Systems	
3	204.2	Heat Removal System	
3	204.3	Instrumentation & Control Systems	
3	204.4	Maintenance Systems	
3	204.5	Reactor Refueling Systems	
3	204.6	Auxiliary Systems	
2	205	Project Support	Project Support
3	205.1*		
3	205.2	Program Management	Program Management
3	205.3	Systems Engineering & Studies	Systems Engineering & Studies
3	205.3	Safety, Licensing, Reliability	

* Project Summary WBS Elements (e.g., Plant Operations) not appropriate to either CWBS illustrated.

FIGURE 6 CONTRACT WBS COMPARISON

5. Performance Measurement

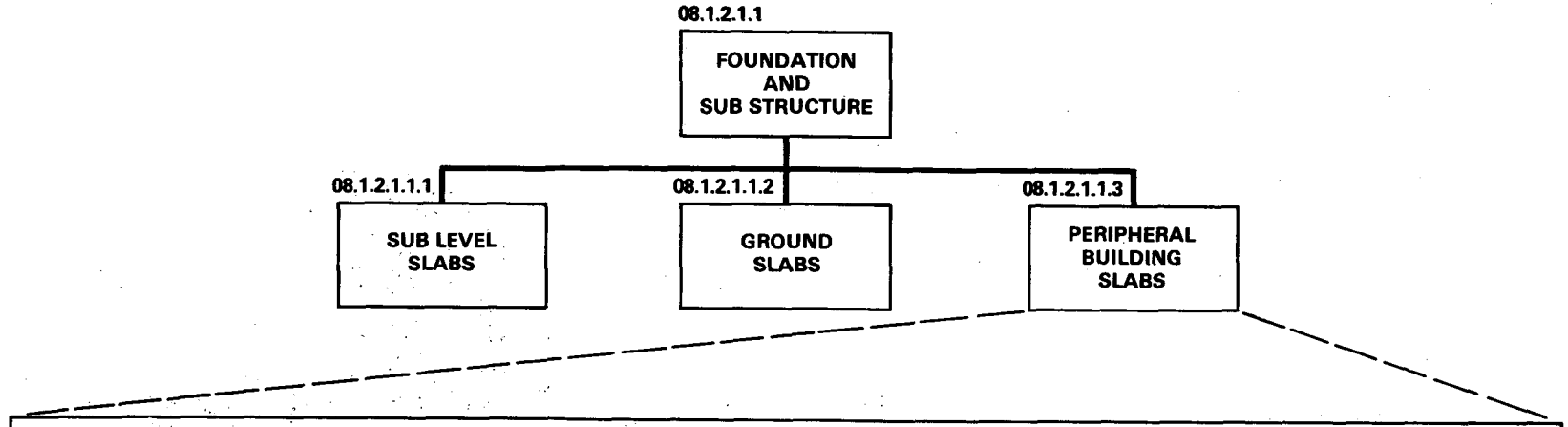
a. CSCSC Applicable

The WBS technique accomplishes the CSCSC objective of work definition and provides the basis for performance measurement with a product orientation. It also facilitates work measurement at levels which meet specific management needs. Figure 7, page 23, shows a portion of a WBS with a supporting cost account (the level at which performance is measured) including sample performance data.

Contractors use the Cost Performance Report to provide DOE Project Management with such performance data summarized by WBS. As can be seen in Figure 8, page 24, a WBS provides an orderly means of summarizing cost and schedule data. However, care must be exercised to insure correct summarization so that all costs are included, and included only once. In Section A of the WBS in Figure 8, boxed elements are products where work is budgeted and performed and costs are accumulated. Circled elements represent a logical aggregation of products at a level where no work has been performed and costs are summarized from lower levels. Underlined symbols represent the sum of all work packages associated with the product. Note that cost accounts are at the lowest level on a given product branch. The budgeted, earned, or actual value of a given WBS element is the sum of the values of the next lower level elements. As may be seen in Figure 8, the value of a product element at the lowest level is the sum of the work packages making up the related cost account. For the WBS shown in Figure 8, Section A, the equations shown in Sections B and C are valid for summarizing Budgeted Cost for Work Scheduled (BCWS), Budgeted Cost for Work Performed (BCWP), and Actual Cost of Work Performed (ACWP), both current and cumulative, at the cost account level. (Also see Figure 7.) Note that the values of the work added at X, A, B, C, A1, C1 and C2 are all zero. Note, too, that all WBS element values can be derived from the sum of the cost accounts with or without intermediate summarization.

c. CSCSC Not Applicable

When the DOE CSCSC have not been applied to the contract, but the WBS technique is used, DOE Project Management should negotiate with the contractor the type, levels, and elements of WBS performance reporting to be submitted. DOE Order 1332.1 provides guidance for such reporting. Most of the CSCSC data elements associated with performance measurement can be effectively used for this purpose.



COST ACCOUNT

Cost Account No.: 08.1.2.1.1.3.101
Cost Account Mgr.: W. Lowerre
Organization No.: 101

WBS Title: Energistic Demo Unit #1
Element Title: Peripheral Building Slabs
Element No.: 08.1.2.1.1.3

Schedule Start: 1/3/81
Schedule Finish: 12/31/81
Actual Start: 1/6/81
Actual Finish:

INCREMENTAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	CURRENT YEAR + 1	BEYOND	BUDGET AT COMPLETION
BCWS*	100	100	100	100	100	100	200	200	300	100	100	200	N/A	N/A	1,700
BCWP*	50	150	200												
ACWP*	60	165	220												
CUMULATIVE															
BCWS	100	200	300	400	500	600	800	1,000	1,300	1,400	1,500	1,700	—	—	1,700
BCWP	50	200	400												
ACWP	60	225	445												

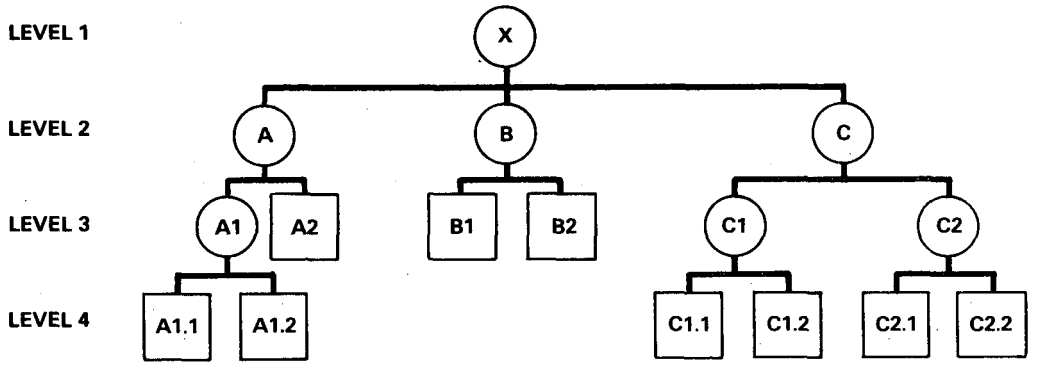
Work Package References:

Number	Duration	Budget
AA	3 Jan-15 Jul	700
AB	1 Jul-31 Dec	1000

* CSCSC Performance Measurement Data Elements
BCWS — Budgeted Cost for Work Scheduled
BCWP — Budgeted Cost for Work Performed
ACWP — Actual Cost of Work Performed

FIGURE 7 TYPICAL COST ACCOUNT DATA

A. SAMPLE WBS



B. GENERAL COST ACCUMULATION EQUATIONS FOR SAMPLE WBS

VALUE OF ANY WBS ELEMENT AT ANY UPPER LEVEL	=	SUM OF THE VALUES OF THE NEXT LOWER LEVEL ELEMENTS
VALUE OF ANY WBS ELEMENT AT THE LOWEST LEVEL	=	SUM OF THE VALUES OF THE COST ACCOUNT WORK PACKAGES

C. SPECIFIC COST ACCUMULATION EQUATIONS FOR SAMPLE WBS

X = A + B + C, WHERE:

A = A1 + A2

A1 = A1.1 + A1.2

A1.1 = A1.1

A1.2 = A1.2

A2 = A2

B = B1 + B2

B1 = B1

B2 = B2

C = C1 + C2

C1 = C1.1 + C1.2

C1.1 = C1.1

C1.2 = C1.2

C2 = C2.1 + C2.2

C2.1 = C2.1

C2.2 = C2.2

ALSO:

X = A2 + A1.1 + A1.2 + B1 + B2 + C1.1 + C1.2 + C2.1 + C2.2

Note: Underline Identifies Cost Account Work Packages

FIGURE 8 SAMPLE WBS DATA SUMMARIZATION

C. SPECIFIC MANAGEMENT USES

A WBS can serve as a useful tool in performing specific project support and testing activities. Configuration Management, Integrated Logistics Support and Test and Evaluation are examples of such activities. Use of the WBS technique to support these activities is described briefly in the following sections.

1. Configuration Management

Configuration Management is the task of managing, controlling and reporting the planned and actual design of items throughout their intended life. For Configuration Management, the CWBS is extended sufficiently to identify elements selected for this purpose.

NOTE: It is not necessary that the CWBS level identified for project control purposes (e.g., contract reporting) be the same as that used for Configuration Management.

2. Integrated Logistic Support

Integrated Logistic Support is a composite of all support considerations necessary to assure the effective and economical support of a system or equipment for its life cycle. This task manifests itself in a WBS by provision of an element or a series of elements applicable to logistical support activities such as Support and Test Equipment, Spares and Repair Parts, Transportation and Handling, Technical Data, and Training. Essential to incorporating Integrated Logistic Support in a WBS is the integration of support planning with hardware design. The WBS logistic elements should provide the capabilities to support the prime system and its components. The elements should reflect schedule compatibility with the acquisition of the project products and lead time planning needs of the site or test facility activities receiving these items.

3. Test and Evaluation

A WBS may specifically provide for testing systems, subsystems, and components. (Reference the requirement for the content of a DOE Project Management Plan in DOE Order 5700.4.) A Test and Evaluation element can be used to obtain or validate test performance data. This element should cover the detailed planning, conduct, support, data reduction, and reports from the testing. Since testing requires the participation of organizational elements responsible for accomplishing development, reliability, and qualification tests, appropriate supporting elements should be included.

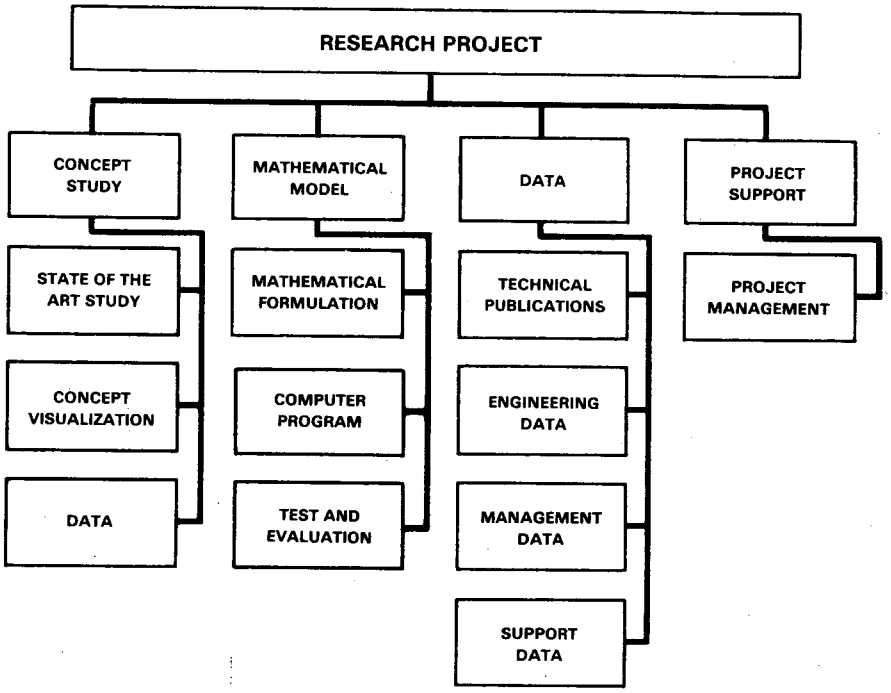
It is to be noted that only testing relating to more than one component should be included in a WBS Test and Evaluation element.

ATTACHMENT A

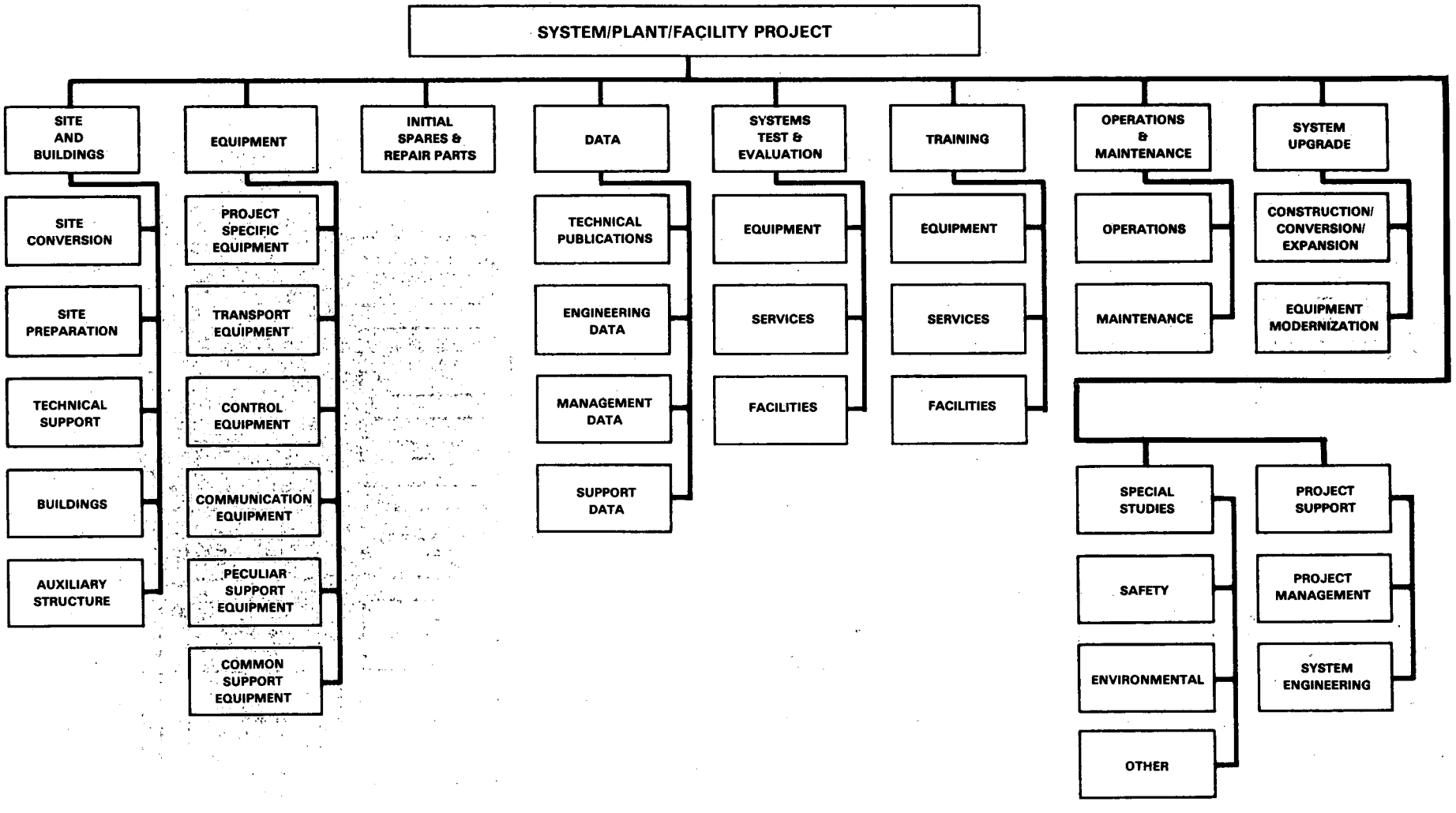
SUMMARY

WORK BREAKDOWN STRUCTURES

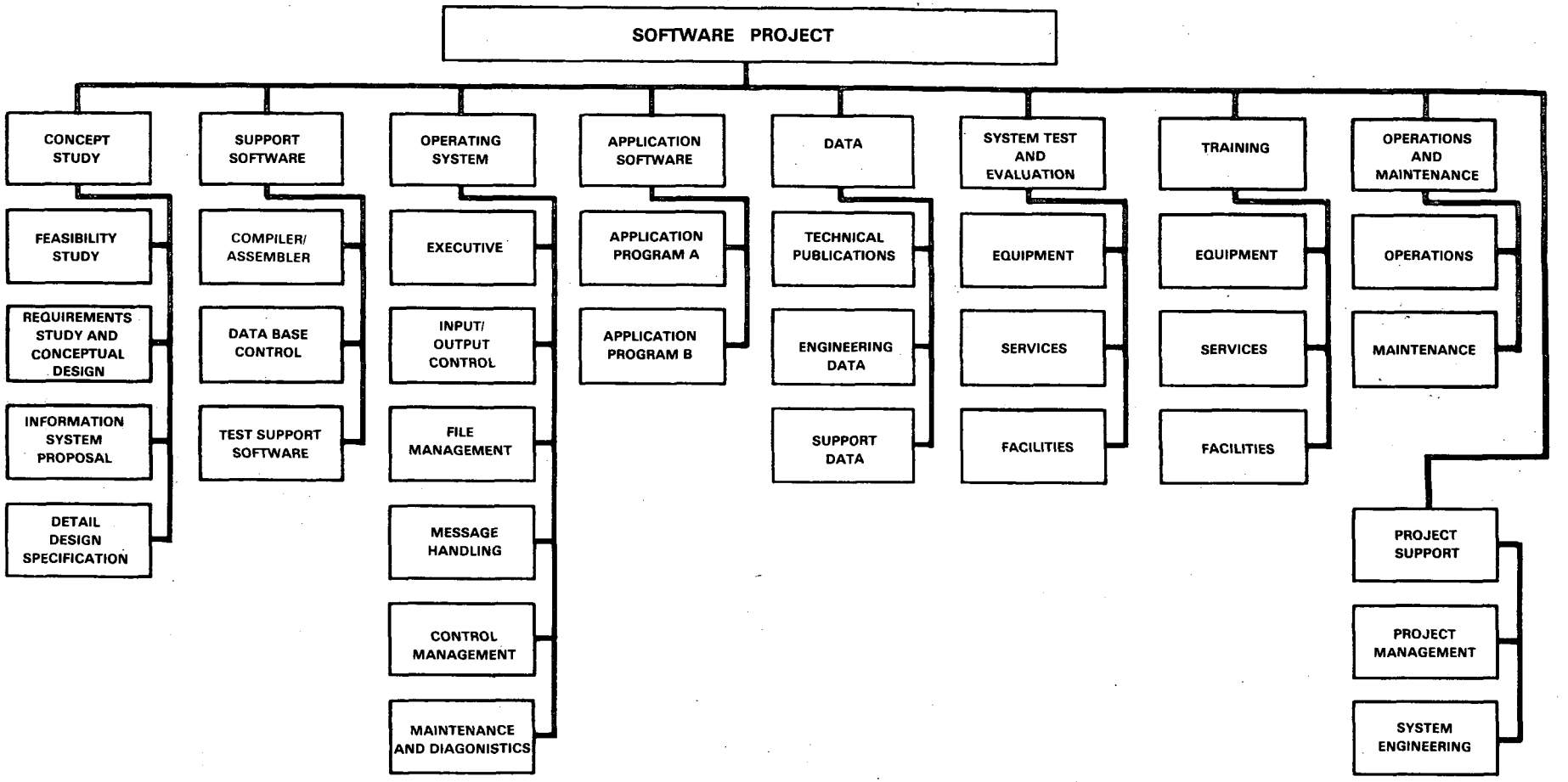
1. Research Project
2. System/Plant/Facility Project
3. Software Project



SUMMARY WORK BREAKDOWN STRUCTURE FOR A RESEARCH PROJECT



SUMMARY WORK BREAKDOWN STRUCTURE FOR A SYSTEM/PLANT/FACILITY PROJECT

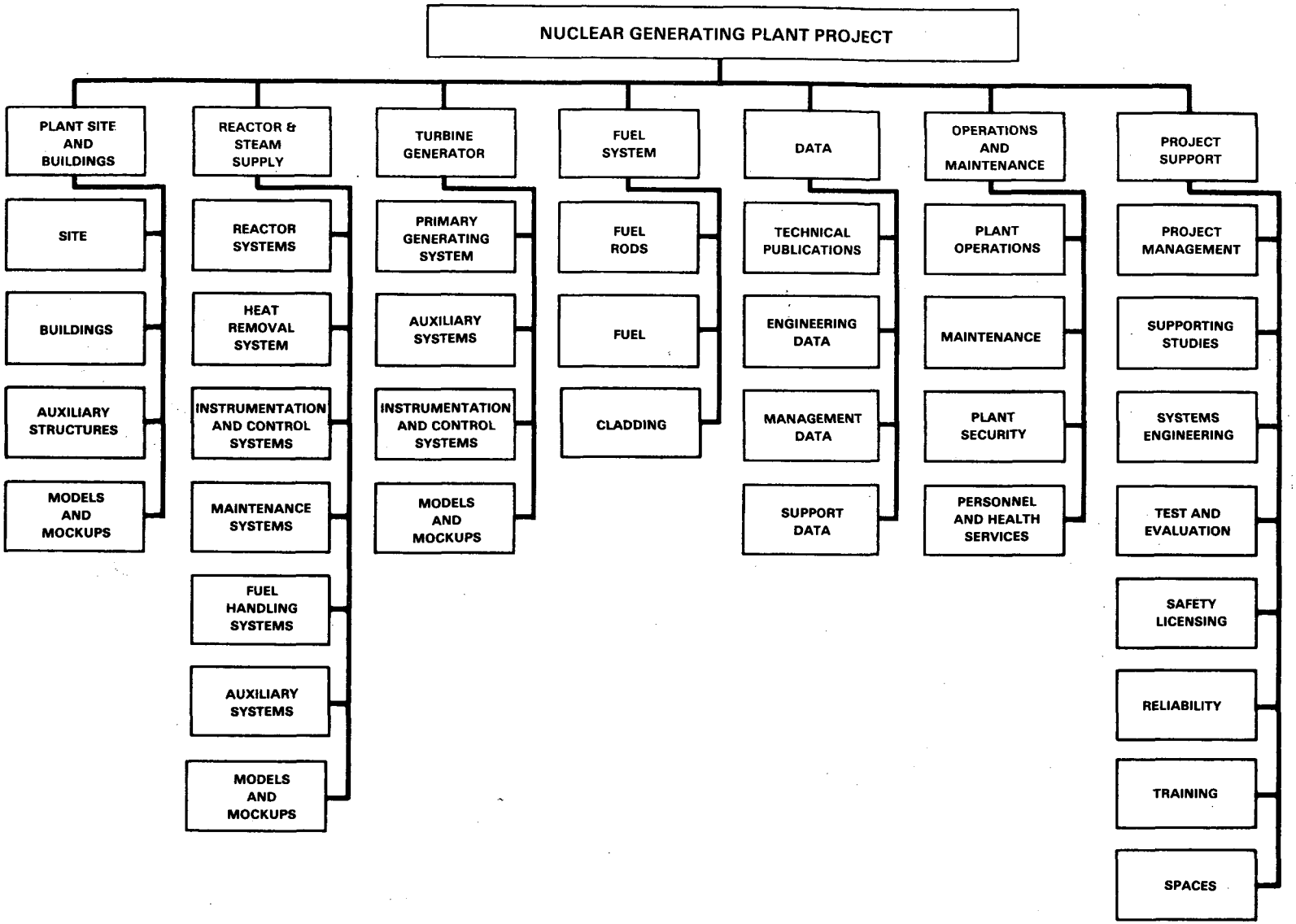


SUMMARY WORK BREAKDOWN STRUCTURE FOR A SOFTWARE PROJECT

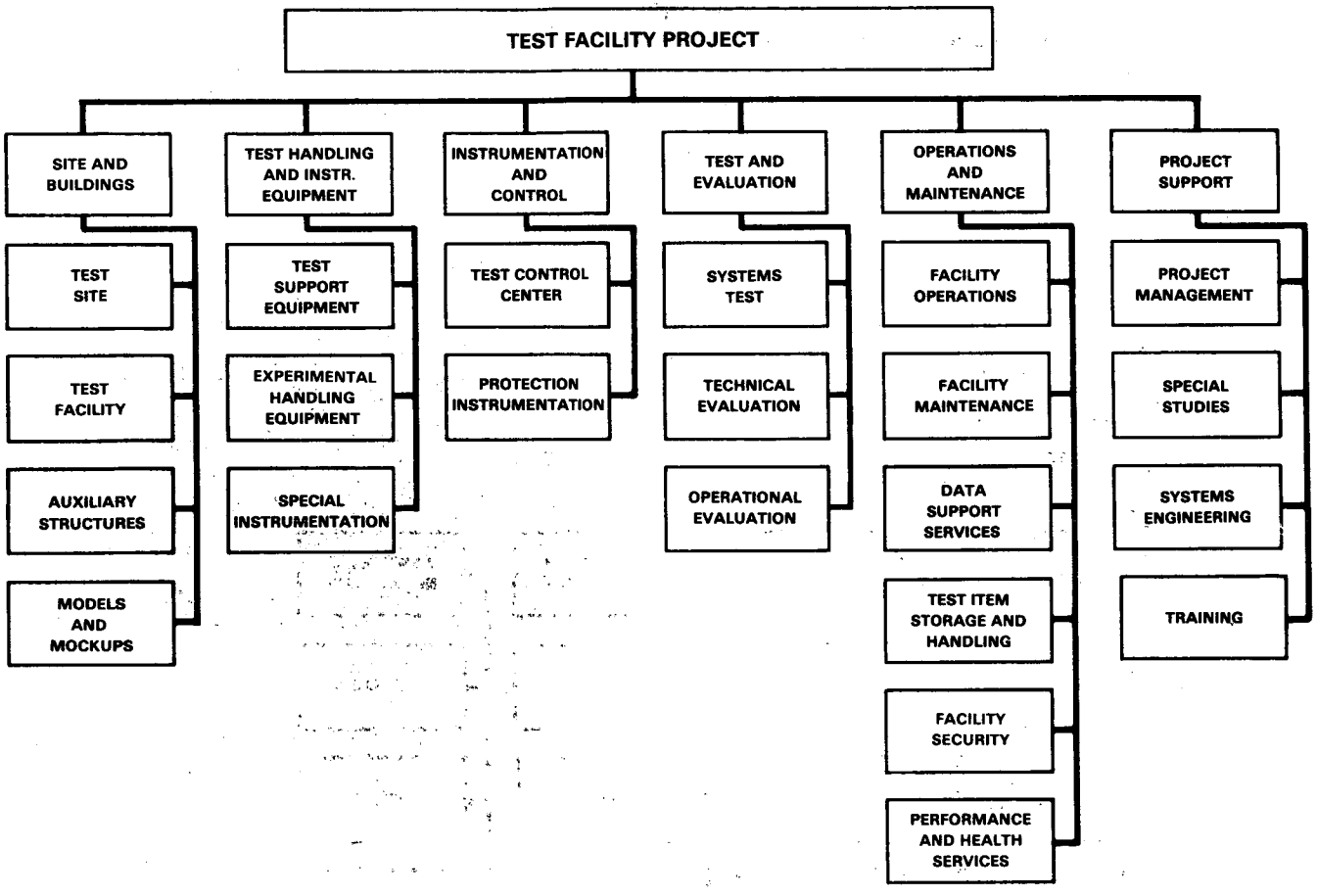
ATTACHMENT B

TYPICAL PROJECT SUMMARY WORK BREAKDOWN STRUCTURES

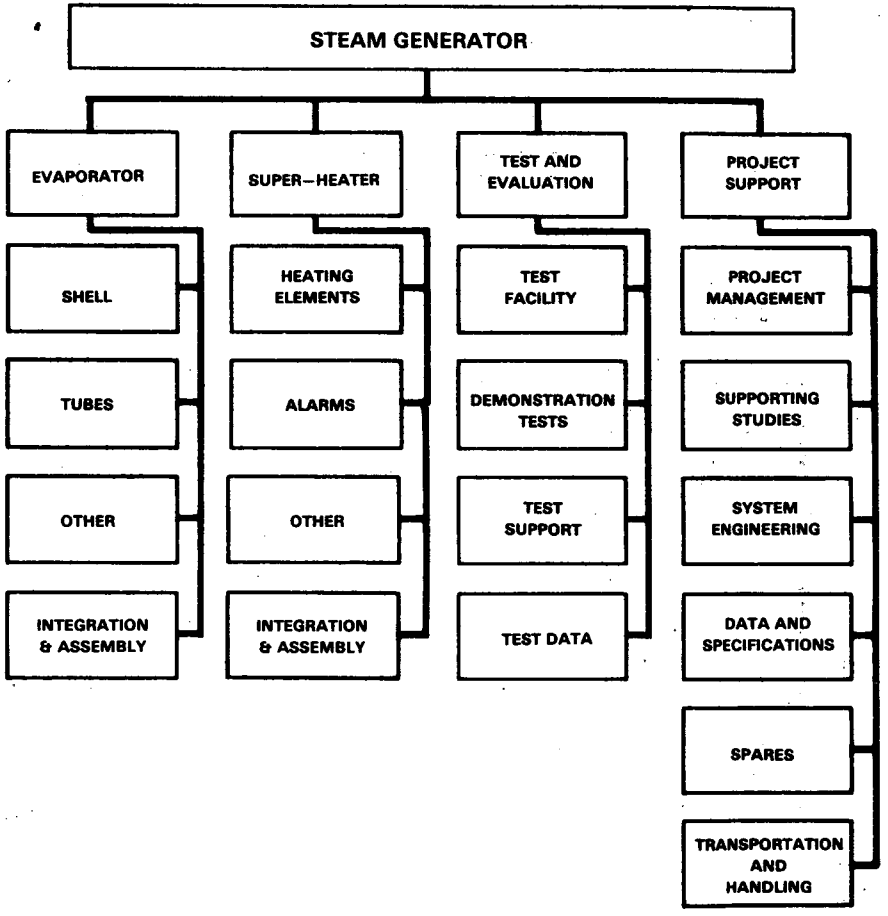
1. Nuclear Generating Plant
2. Test Facility
3. Component
4. Operations and Maintenance



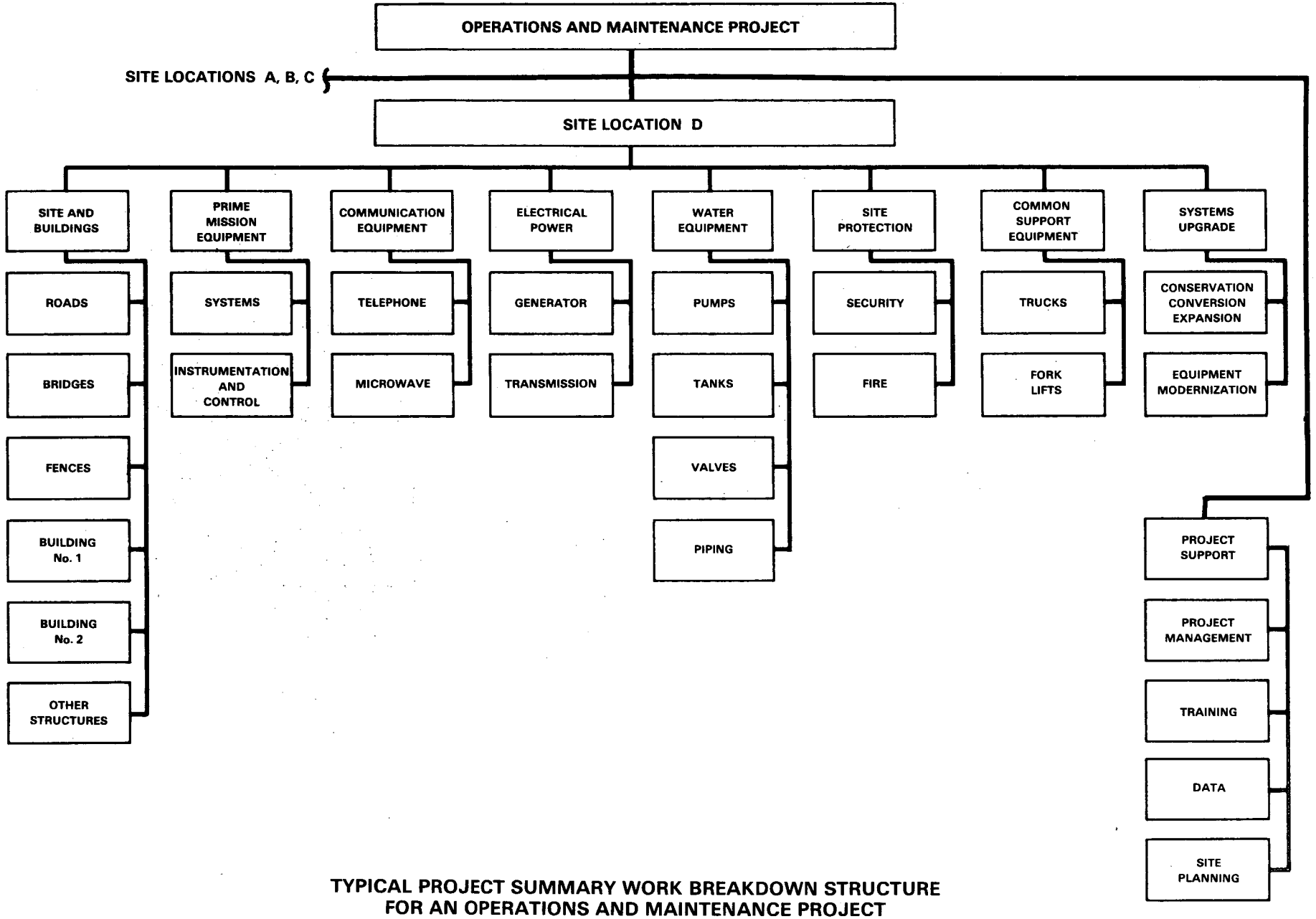
TYPICAL PROJECT SUMMARY WORK BREAKDOWN STRUCTURE FOR A NUCLEAR GENERATING PLANT PROJECT



TYPICAL PROJECT SUMMARY WORK BREAKDOWN STRUCTURE FOR A TEST FACILITY PROJECT



TYPICAL PROJECT SUMMARY WORK BREAKDOWN STRUCTURE FOR A COMPONENT PROJECT



TYPICAL PROJECT SUMMARY WORK BREAKDOWN STRUCTURE FOR AN OPERATIONS AND MAINTENANCE PROJECT

ATTACHMENT C

WORK BREAKDOWN STRUCTURE DICTIONARY

1. Work Breakdown Structure Dictionary
   Part I - Index
2. Work Breakdown Structure Dictionary
   Part II - Element Definition

FORM DOE-142A
(10/80)

FORM APPROVED
OMB NO. 38R-0190

WORK BREAKDOWN STRUCTURE DICTIONARY PART I – INDEX	PROJECT/CONTRACTOR (1) Energistic Demo Unit #1 BKVS Inc.	CONTRACT NO. (2) 10-10-10-2 (2222)	DATE (3) 10/01/82

LINE NO. (4)	WBS ELEMENTS (5) INDENTURE LEVEL 1	2	3	4	5	6	•	•	•	TITLE	CONTRACTOR WBS CODE (6)	BUDGET AND REPORTING CLASSIFICATION (7)	PHASE (8)	OTHER (9)
1	X									*Energistic Demo Unit #1	08.0	AM 15 25 08	C	
2		X								*Site and Bldg	08.1		C	
3			X							*Site Preparation	08.1.1		C	
4				X						Site Survey	08.1.1.1		C	
5				X						Excavation	08.1.1.2		C	
6				X						Grading	08.1.1.3		C	
7				X						Access	08.1.1.4		C	
8				X						Security Parimeter(S/C)	08.1.1.5		C	
9			X							Plant Buildings	08.1.2		C	
10				X						Building #1	08.1.2.1		C	
11					X					*Foundation and Sub Structure	08.1.2.1.1		C	
12						X				Sub Level Slabs	08.1.2.1.1.1		C	
13						X				Ground Slabs	08.1.2.1.1.2		C	
14						X				Peripheral Building Slabs	08.1.2.1.1.3		C	
15					X					*Superstructure and Finishing	08.1.2.1.2		C	
16						X				Framing	08.1.2.1.2.1		C	
17						X				Upper Levels	08.1.2.1.2.2		C	
18						X				Shell	08.1.2.1.2.3		C	
19						X				Exterior Finishing	08.1.2.1.2.4		C	
20						X				Interior Finishing	08.1.2.1.2.5		C	
21				X						Building #2	08.1.2.2		C	
22			X							*Technical Support	08.1.3		C	
23		X								*Equipment	08.2		C	
24		X								Data	08.3		C	

EXAMPLE WORK BREAKDOWN STRUCTURE DICTIONARY
PART I - INDEX

THIS REPORT IS REQUIRED IN ACCORDANCE WITH 42 U.S.C. 7284 AND 40 U.S.C. 471 ET SEQ. FAILURE TO REPORT MAY RESULT IN CONTRACT TERMINATION OR PENALTIES AS PROVIDED BY LAW

SEE DOE/CR 0801.3 FOR PROVISIONS CONCERNING CONFIDENTIALITY OF INFORMATION

PREPARATION INSTRUCTIONS – PART I - INDEX

The WBS Index lists the preliminary WBS elements extended to the lowest level required. Complete only applicable blocks. Specific project requirements may be added as needed.

HEADER:

- Block 1. Enter project title and name of contractor
- Block 2. Enter applicable contract number
- Block 3. Enter date of preparation

WBS INFORMATION

- Column 4. Line Number. Enter sequential numbers to identify each entry.
- Column 5. WBS Elements. Enter the WBS element title and an "X" to reflect the level, e.g., Level 1 is the contract. Level 2, 3, etc., are successively lower indentures of the contract WBS. Enter an asterisk (*) before the title of each element to be reported and under project control. Enter a parenthetic (s/c) following each subcontracted element title.
- Column 6. Contractor WBS Code. Enter the code devised by the contractor for internal identification of the WBS element.
- Column 7. Budget and Reporting Classification (B&R). Enter the appropriate B&R.
- Column 8. Phase Designator. Enter the appropriate designator from the table below to identify the project phase of the contract:

R	=	Research	D	=	Demonstration
Dv	=	Development	O	=	Operation
C	=	Construction	P	=	Production

- Column 9. Other. Add columns as required to cross-reference the WBS element to other pertinent documents. For example, columns may be added for System Design Description Number, Configuration Item Number, Statement of Work Number, etc., and the applicable reference entered.

FORM DOE-1428 (10/80) | U.S. DEPARTMENT OF ENERGY | Form Approved O.M.B No. 38R-0190

WORK BREAKDOWN STRUCTURE DICTIONARY

PART II – ELEMENT DEFINITION

WBS ELEMENT CODE: 08.1.1 (1)
TITLE: Site Preparation
CONTRACTOR: BKVS Inc.

INDEX LINE NO. (2)	REVISION NO. AND AUTHORIZATION (3)	DATE (4)
3	N/A	10/01/82

APPROVED CHANGES (5)
N/A

SYSTEM DESIGN DESCRIPTION (6)	FUNDING DOCUMENTS (7)
NUMBER: 08.1.1 TITLE: Site Preparation	82-5G

ELEMENT TASK DESCRIPTION (8)

COST CONTENT

Engineering Labor
Construction Labor
Material Procurement
Subcontracted efforts:
- Drayage
- Warehousing
- Equipment rental

Overhead
G&A
Fee

TECHNICAL CONTENT

Site Surveying
Geological studies
Excavation
Grading
Access
Security perimeter

WORK STATEMENT

Survey selected site and determine site-loading potential. Determine optimum structure orientation and layout foundations.
Establish right-of-way for access roads and define security perimeter.
Grade access and evaluate drainage and setting. Excavate main and peripheral building sites, erect pilings, pour liners and foundation slabs, utility trenches and sewage; mark hookups to local utilities (water, sewage, etc.).

PAGE 2 OF 2

EXAMPLE WORK BREAKDOWN STRUCTURE DICTIONARY
PART II - ELEMENT DEFINITION

THIS REPORT IS REQUIRED IN ACCORDANCE WITH 42 U.S.C. 7254 AND 40 U.S.C. 471 ET SEQ. FAILURE TO REPORT MAY RESULT IN CONTRACT TERMINATION OR PENALTIES AS PROVIDED BY LAW

SEE DOE/CR-0001/3 FOR PROVISIONS CONCERNING CONFIDENTIALITY OF INFORMATION

PREPARATION INSTRUCTIONS – PART II – ELEMENT DEFINITIONS

Part II describes the WBS elements contained in the Index and their relationship to design and funding documents. Complete only applicable blocks. Specific project requirements may be added as needed.

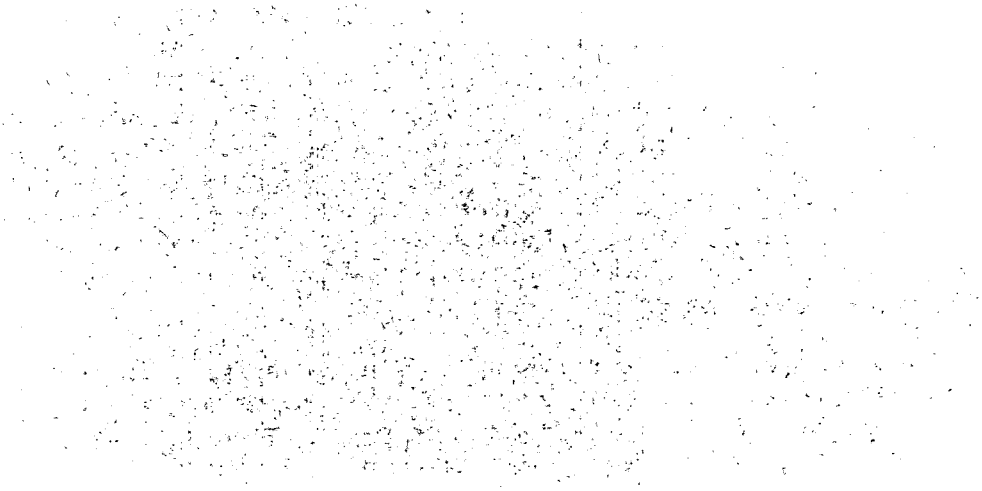
- Block 1. Enter the WBS element code from Column 6 Part I, element title, and contractor.
- Block 2. Enter the Index Line Number.
- Block 3. Enter the identifier of the current revision and reference the authorizing document.
- Block 4. Enter date of preparation.
- Block 5. Enter the identifier and short title of previously approved changes to the WBS element.
- Block 6. Enter the System Design Description Number and title or other appropriate system specification identification pertaining to the WBS element.
- Block 7. Enter the funding sources and appropriate identifier (e.g., number or title, or both) of the funding document associated with the WBS element.
- Block 8. Cost Content – Describe the type of organizational entities and/or elements of costs charged to the WBS element (e.g., Construction Labor, Engineering Labor, Electrical Cable, Vendor Tooling, Subcontracted Effort, Computer Operation, Travel, Printing, etc.).

  Technical Content – Describe, the technical content (e.g., heat transport system), the components included (e.g., instrumentation and controls), their relationships to each other (e.g., operating temperatures and pressures), and how they support other WBS elements (e.g., reactor core).

  Work Statement – Describe the functional activity or service necessary to make the product or to accomplish the work objectives of the WBS element (e.g., planning, designing, fabricating, constructing, integrating, testing, etc.).

ATTACHMENT D

DEVELOPMENT OF A PROJECT SUMMARY WBS



1. INTRODUCTION

The following sections briefly describe the basis for development of a Project Summary WBS for a Fuel Gas Plant Project. This Project Summary WBS evolved from an analysis of the project objectives, the plant product description (including data and services), the procurement plan, and the process flow chart.

2. PROJECT OBJECTIVES

The project consists of the design, construction, testing, operation, and evaluation of a plant based on a process which will convert high-sulfur caking coal to medium-Btu fuel gas and do so in an environmentally acceptable manner. Specific objectives are to:

a. Verify technical, economic, and environmental viability of large-scale energy systems in operational circumstances through design, construction, testing, and evaluation;

b. Provide demonstrated technology for dissemination throughout the industry; and

c. Motivate private industry to construct coal gasification plants on their own initiative using private funds.

The project consists of three phases:

Phase I	Project Development and Conceptual Design
Phase II	Detail Design, Procurement, and Construction
Phase III	Plant Operation

3. THE PLANT

The plant is designed to produce approximately 50 billion Btu per day, roughly equivalent to 10,000 barrels of oil, from 3160 tons of coal. The industrial fuel gas has a heating value of 300+/-30 Btu/Standard Cubic Foot (SCF). About 154 million SCF per day or 45 billion Btu per day of this product gas is sent out to customers by a separate pipeline. The remaining 5 billion Btu per day is upgraded to pipeline quality gas (950 Btu/SCF) and deposited in the prime contractor's natural gas distribution system to generate credit. The credit can be withdrawn and used to satisfy the prime contractor's customer demand during normal plant shutdown.

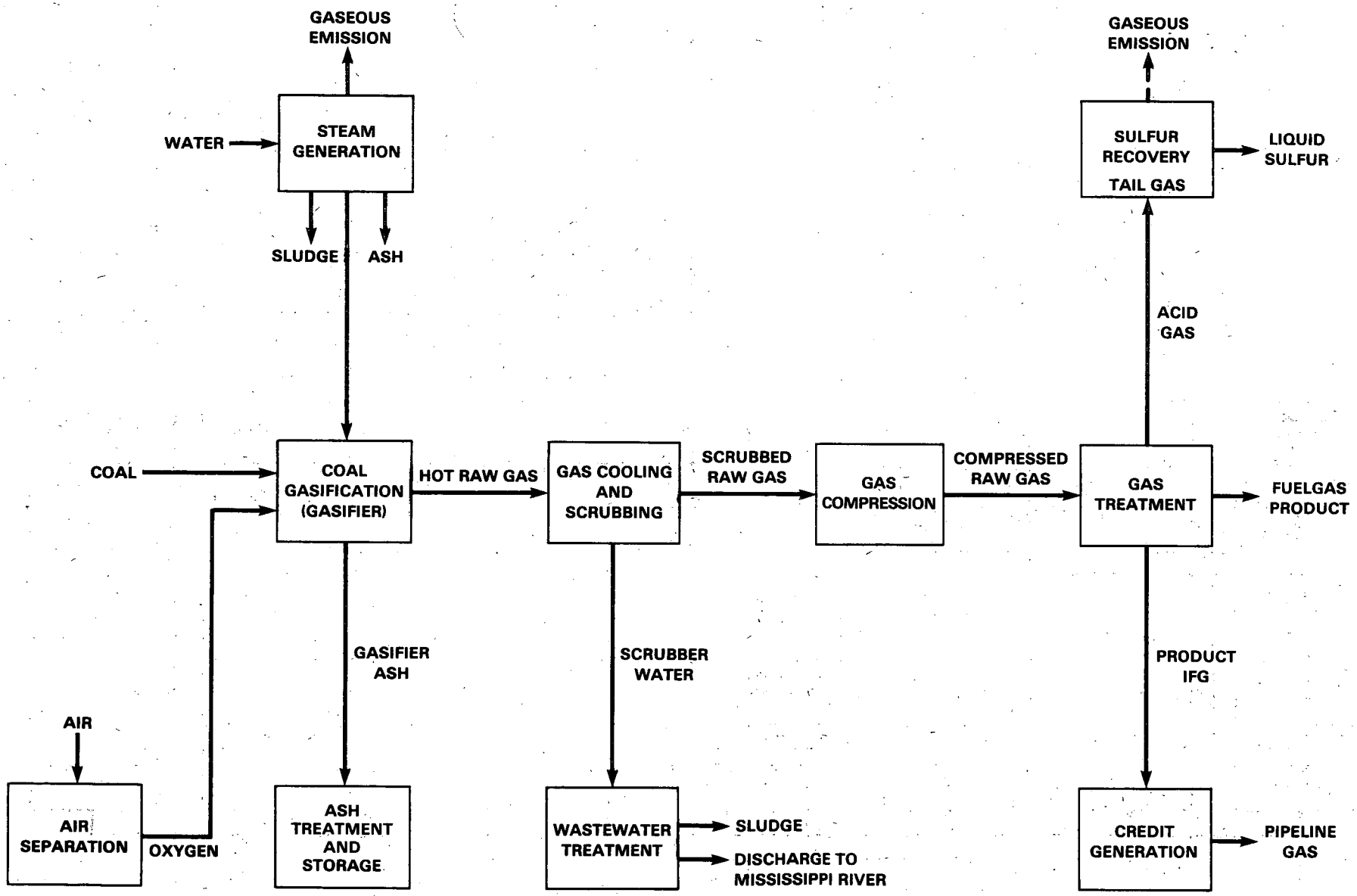
The plant accomplishes four important functions in a single-stage, fluidized-bed gasifier (see page D-4). The plant decakes coal, devolatilizes coal, gasifies coal, and separates ash as agglomerates from char. Within the gasifier, coal reacts with steam and oxygen producing a gas mixture of hydrogen, carbon monoxide, carbon dioxide, and methane. Simultaneously with coal gasification, the ash is agglomerated into spherical particles. The ash agglomerates are selectively separated and discharged from the bed into water-filled ash hoppers where they are

withdrawn as a slurry. By using the techniques of ash agglomeration, the fluidized bed achieves the same low level of carbon losses in the discharge ash that is generally associated with the ash-slagging type of gasifiers. The raw gas is cleaned and purified using commercially available technology.

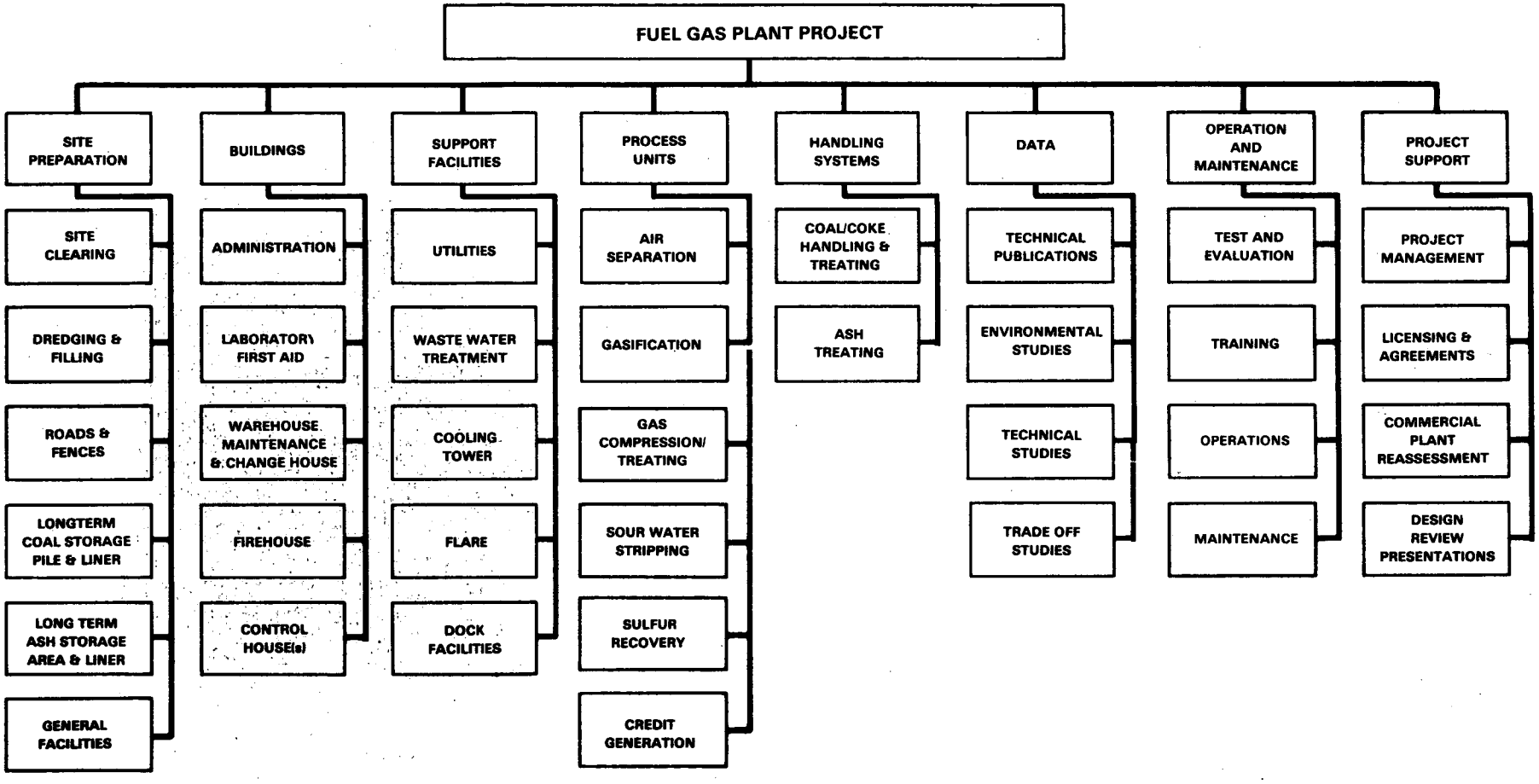
4. PROCUREMENT PLAN

A cost-sharing arrangement has been structured which calls for the Government to fund the entire cost of Phase I, with the costs of Phases II and III to be apportioned between DOE and the prime contractor.

The scope of work is represented by the Project Summary Work Breakdown Structure (see page D5). The contractor will provide the personnel, equipment, facilities, and material for performance of the work under Phase II - Final Design, Procurement, and Construction, and Phase III - Plant Operation, in accordance with the Contract Statement of Work.



SIMPLIFIED BLOCK FLOW DIAGRAM OF THE FUEL GAS PLANT



PROJECT SUMMARY WORK BREAKDOWN STRUCTURE FOR A FUEL GAS PLANT PROJECT

ATTACHMENT E

SOLICITATION AND CONTRACT CLAUSES

1. Solicitation Clause
2. Contract Clause

SOLICITATION CLAUSE

In the preparation of a response to this solicitation:

(a) The offeror shall extend the preliminary Contract Work Breakdown Structure (CWBS) contained in the solicitation as low as necessary to identify and structure the work effort to successfully achieve the end objective(s) of the contract scope of work. The preparation of a CWBS is described in the DOE/CR-0016 Cost and Schedule Control Systems Criteria (CSCSC) for Contract Performance Measurement, Work Breakdown Structure Guide. The offeror shall develop the lower levels of the preliminary CWBS in a manner that will assure compatibility with his organization and management systems.

(b) The offeror shall submit the CWBS in the format of a WBS Dictionary, as specified in the DOE Uniform Contract Reporting System Guidelines, Vol. 1, DOE/CR-0001/2, and described in the Work Breakdown Structure Guide. Changes proposed by the offeror to the preliminary CWBS included in the solicitation package shall be identified appropriately. The offeror shall provide information and assistance as requested by the Source Evaluation Board for evaluation of the CWBS submitted.

(c) The CWBS proposed by the offeror will be evaluated prior to contract award. Upon approval of the CWBS, the WBS Dictionary will be revised to list and define the approved CWBS elements. Subsequent changes to specified project controlled CWBS elements will require prior written approval of the Contracting Officer.

CONTRACT CLAUSE

(a) In the performance of the work under this contract, the Contractor shall establish, maintain, and use the Contract Work Breakdown Structure (CWBS) approved by the Contracting Officer. The approved CWBS, in the WBS Dictionary format, as required by DOE/CR-0016, Cost and Schedule Control System Criteria (CSCSC) for Contract Performance Measurement, Work Breakdown Structure Guide, shall be maintained and used by the Contractor in the performance of the contract work.

(b) If the Contractor proposes any changes to the project controlled CWBS elements identified in the approved WBS Dictionary which require prior approval, they shall be submitted to the Contracting Officer in WBS Dictionary format with supporting justification. The Contracting Officer shall advise the Contractor in writing of his approval or disapproval of such changes.

(c) The specified lower level CWBS elements that do not require prior approval for revision may be changed by the Contractor. After such changes are made, the Contractor will submit appropriate revisions to the WBS Dictionary to the Contracting Officer.

(d) The reporting format by CWBS elements will be as directed by the Contracting Officer.

(e) Deviations from the approved CWBS discovered during contract performance evaluation conducted by the Government shall be corrected as directed by the Contracting Officer.

ATTACHMENT F

REPORTING REQUIREMENTS CHECK LIST

DOE FORM 537

U.S. DEPARTMENT OF ENERGY

REPORTING REQUIREMENTS CHECKLIST

(See Instructions on Reverse)

FORM DOE 537
(Revised 10/80)

FORM APPROVED
OMB NO. 38R-0190

1. IDENTIFICATION:

2. OBLIGATION INSTRUMENT:

3. REPORTING REQUIREMENTS:

A. PROJECT MANAGEMENT:	Frequency	B. TECHNICAL INFORMATION REPORTING:	Frequency
1. ☐ Management Plan		1. ☐ Notice of Energy RD&D Project	
2. ☐ Milestone Schedule & Status Report		2. ☐ Technical Progress Report	
3. ☐ Cost Plan		3. ☐ Topical Report	
4. ☐ Manpower Plan		4. ☐ Final Technical Report	
5. ☐ Contract Management Summary Report		C. COST/SCHEDULE CONTROL SYSTEM CRITERIA REPORTING:	
6. ☐ Project Status Report		1. ☐ Management Control System Description	
7. ☐ Cost Management Report		2. ☐ WBS Dictionary	
8. ☐ Manpower Management Report		A. ☐ Index	
9. ☐ Conference Record		B. ☐ Element Definition	
10. ☐ Hot Line Report		3. ☐ Cost Performance Reports	
		A. ☐ Format 1 - WBS	
		B. ☐ Format 2 - Functional	
		C. ☐ Format 3 - Baseline	

FREQUENCY CODES:

A - As Required
C - Contract Change
F - Final (End of Contract)
M - Monthly
O - One Time (After Contract Award)
Q - Quarterly
S - Semi-annually
X - Mandatory for Delivery with Proposal Bid
Y - Yearly or Upon Contract Renewal

4. SPECIAL INSTRUCTIONS:

5. ATTACHED HEREWITH:

☐ Report Distribution List ☐ WBS/Reporting Category ☐

6. PREPARED BY (Signature and date):

7. REVIEWED BY (Signature and date):

REPORTING REQUIREMENTS CHECKLIST

PURPOSE

A checklist to identify and communicate additional reporting requirements which are not otherwise set forth in the General Purpose clauses of DOE contracts and agreements. It will be included as part of the contract or agreement. This form will be completed for each proposed contract or agreement and can be modified as required in Special Instructions to adapt it to a specific situation.

INSTRUCTIONS

Item 1 – Enter the title as indicated in the Procurement Request, Interagency Agreement, or initiating memorandum.

Item 2 – Enter the identification number of the Procurement Request or Interagency Agreement, the date of the memorandum, and contract number after award.

Item 3 – Check spaces to indicate plans and reports required. For each reporting requirement checked, indicate frequency of delivery in column provided using one of the frequency codes shown.

3.A.1 *Management Plan* – The contractor's plan to manage the effort described in the statement of work or similar document. It will contain management methodologies, control systems, and procedures he will use. Includes milestones and other planning schedules, organizational identification and descriptions, and special and critical plans, such as test plans, plans for handling of Government owned property. Work breakdown structures, key personnel identification, and methods for monitoring progress toward objectives may be required.

3.A.2 *Milestone Schedule and Status Report* – The contractor's milestone schedule for all work breakdown structure items, line items, or deliverables specified in the contract. Updated periodically (usually monthly) with status, progress toward completion, and percent completion of each line item and of the total contract.

3.A.3 *Cost Plan* – A baseline plan for incurring costs on a contract or agreement to measure progress in terms of cost; update and forecast contract fund requirements; plan funding changes; and develop fund requirements and budget estimates.

3.A.4 *Manpower Plan* – A baseline plan to allocate manpower to each reporting category identified in the contract or agreement.

3.A.5 *Contract Management Summary Report* – A single-page graphic presentation of integrated cost, major milestones, and manpower for rapid visual analysis and trend forecasting.

3.A.6 *Project Status Report* – A periodic report to communicate to DOE management an assessment of contract status, to explain variances and problems, and to discuss any other areas of concern or achievements.

3.A.7 *Cost Management Report* – A periodic report of the status of costs compared to the Cost Plan. Data is used to: report actual and projected accrued costs; evaluate performance against plan; identify actual and potential problem areas; construct cost experience for projects and budgeting efforts; and, to verify the reasonableness of contractors' invoices.

3.A.8 *Manpower Management Report* – A periodic report of the status of actual and projected manpower expenditure against the Manpower Plan. Data is used to evaluate performance against plan; identify actual and potential problem areas; and to construct manpower experience for projections and planning efforts.

3.A.9 *Conference Record* – Documentation of the contractor's understanding of significant decisions, direction or redirection or required actions resulting from any meeting with DOE representatives.

3.A.10 *Hot Line Report* – A hardcopy report by the fastest means available, (TWX, etc) documenting critical problems, emergency situations, and important technical breakthroughs.

3.B.1 *Notice of Energy R&D Project* – A formatted, two-page report to provide information on unclassified DOE R&D projects for dissemination to the scientific, technical, and industrial communities and to the public. Also provides information to the Smithsonian Scientific Information Exchange.

3.B.2 *Technical Progress Report* – A formal, structured technical report, submitted periodically to communicate project results for dissemination to Government agencies, the scientific, technical and industrial communities and the public.

3.B.3 *Topical Report* – A special technical report prepared when a project has reached a point at which a major milestone or a significant phase has been completed, when unexpected results have been achieved, when it is logical to summarize results achieved, or when a new scientific or technological finding is deemed to warrant prompt publication.

3.B.4 *Final Technical Report* – Technical Progress Report reporting final results of DOE supported RD&D and scientific projects.

3.C CSCSC

1) *System Description* – Contractor's description of the management control system to be used in performing contract work.

2) *WBS Dictionary* – Lists and defines work breakdown structure. For more detailed instructions see CSCSC Manual.

3) *Cost Performance Report (PMS Application)*

Format 1 – Reports current period and cumulative budget, actual costs and earned value data by work breakdown structure elements. Identifies cost and schedule variances and provides contractor's estimate to complete comparisons to budgets.

Format 2 – Reports current period and cumulative budget, actual costs, and earned value data by contractor functional elements.

Format 3 – Provides periodic updating to the established performance measurement baseline. Incorporates authorized contract changes and internal re-planning into the performance measurement baseline.

Frequency Codes – Each code must have an identified time period (i.e., As Required – 5 days after event occurrence). These time periods are suggested in the solicitation and negotiated at contract award.

Item 4 – Identify any special reporting requirements not indicated in Item 3 and/or qualifiers to those selected. (Use additional sheets as necessary.)

Item 5 – Check appropriate blocks.

Report Distribution List – A comprehensive informative listing of reports by frequency of submission, addresses and number of copies for each addressee.

Reporting Categories (level of detail) – An identification by WBS level of task elements for which reporting will be required by DOE.

Item 6 – Signature of person or persons preparing the checklist and the date prepared. Preparation is by person or persons responsible for preparation of Procurement Request or Statement of Work.

Item 7 – Signature of the person reviewing the check list and date reviewed.

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