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DOE Uniform Contractor Reporting System

Use of Data Handbook

U.S. DEPARTMENT OF ENERGY
Office of the Controller 950-8372
Office of Program Management Support

September 1979

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**U.S. DEPARTMENT OF ENERGY
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Washington, D.C. 20585**

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Foreword

This handbook is intended as an aid to project management within DOE by delineating ways in which data provided by the Uniform Contractor Reporting System (UCRS) can be evaluated and analyzed. Such evaluation and analysis can serve as one of the bases for the review of contractors' progress and of project status, and for forecasting future performance trends. The various methods for analysis, interpretation, display, and evaluation of UCRS data suggested in the handbook can be tailored or combined to fit specific cases. Also, this handbook is not all-encompassing and techniques may be in use at certain project offices which could be included in future revisions of this handbook. You are urged to submit descriptions of methods and procedures which you consider applicable, as well as other suggestions for making this handbook of optimum value to the DOE project management community.

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Part I. Introduction

A. The DOE Project Management Team

The DOE Project Manager (PM) performs all normal management functions of planning, organizing, directing, coordinating, and controlling the actions which must be undertaken to achieve the objectives of the project/program. In some cases, these actions are undertaken by a team of persons, located both inside and outside the PM's office, including contractors' facilities. No matter where the work is being performed, the PM must coordinate, combine, and steer these actions to assure that they are performed effectively and that they result in a technically acceptable project within time and cost limitations. The PM has direct control of the resources and the operations for work being performed within the office. For that portion of the effort which is being performed under one or more contracts, the PM discharges his responsibilities by means of:

- Objectives and tasks which are clearly stated and defined in the contract, including established milestones;
- A management (baseline) plan which identifies how the contractor will execute the project.
- Periodic consultations with the contractor to complement periodic status reports. The latter must relate directly to the baseline plans and show both progress toward achieving contract objectives and problems which impede or threaten to impede progress.
- Undertaking actions which appear essential to maintain the program on course or to bring it back on course when it is not.

In his contact with contractors, the PM is assisted by the Government Technical Representative (GTR) who has responsibility for overall technical monitoring of a contract. In some cases, the functions of the GTR may be carried out within the office of the PM, possibly by the PM personally. The GTR functions consist of monitoring the technical work performed under the contract, evaluating the contractor's performance, providing the contractor and the contracting officer with technical guidance, reporting on project status to the program/project managers, and initiating and recommending corrective action when indicated.

B. Uniform Contractor Reporting System (UCRS)

To aid the DOE project management team in managing contractual performance, the UCRS has been established as a standard procedure for collecting and integrating essential cost, manpower, schedule, and technical information. The system was designed to provide the minimum essential information in the easiest and most cost-effective manner possible and, at the same time, to minimize the reporting burden placed on contractors. The system is described in detail in the Uniform Contractor Reporting System Guidelines, Volume I (DOE/CR-0001/2, September 1978). This Volume should be carefully studied by those within the office of the DOE PM who are charged with monitoring the contractual effort and by others responsible for contractual surveillance. Briefly, the UCRS works as follows:

1. The Guidelines contain forms and instructions for the plans and reports of the Uniform Contractor Reporting System.
2. Before issuing a Request for Proposal (RFP), the DOE project manager determines the information that will be required from the contractor to monitor the proposed contract and to satisfy information needs of other DOE offices. Reporting requirements can be specified on the Reporting Requirements Checklist (DOE Form 537). Also, the level of detail (such as summary, detail, or cost element) and the reporting structure (such as by a Work Breakdown Structure, by contract line item or by cost element) are shown either in special instructions or as attachment to the Reporting Requirements Checklist. The completed Checklist is included in the RFP package to inform the contractor of what management information will be expected, how often it should be submitted,

and to whom it should be sent. A copy of the UCRS Summary is included in the Proposal to provide bidders with an understanding of the reporting requirements. After award and negotiation with the contractor, the Checklist and its attachments becomes part of the contract.

3. A Management Plan (including baseline plans) is submitted with the contractor's proposal and, if required, is updated soon after contract award. The Management Plan is the contractor's master plan of how the project will be executed. It may contain separate schedule, manpower (when required), and cost plans to serve as the base against which progress will be measured for the life of the contract. Upon acceptance by DOE, this too becomes part of the contract.

4. Normally, status reports are required of the contractor on a periodic basis. They relate directly to the baseline plans and show project progress to date, current status, and forecasts for future efforts as well as any problems. Status may be reported in terms of cost, manpower, schedule, and technical performance.

5. UCRS also calls for technical reports which are the primary means by which DOE disseminates scientific, and technical information developed under DOE sponsored efforts. However, these reports provide data important also for project management purposes.

6. Also falling under the UCRS umbrella are the DOE Cost and Schedule Control System (CSCS) (formerly identified as Performance Measurement System) reports, otherwise known as "Earned Value" reports, used on selected contracts. The reports and instruction for their preparation are contained in UCRS Guidelines, Volume I. A description of the CSCS and the guide for its implementations including the CSCS Criteria, are contained in DOE publications RDD/PMS -1 and -2, respectively.

C. Applying UCRS Reports to Project Management.

Normally the DOE Project Manager is physically removed from the contractor's facility where the work is being performed; also, he may be responsible at any given time for a number of projects with possibly several contracts under each. Under these conditions, the application of the DOE Uniform Contractor Reporting System is one step toward improved management of contractual performance on DOE programs and projects. For an experienced, competent DOE PM, with effective contacts with the contractor's project manager, UCRS data and particularly the status reports may merely supply written, quantified confirmation of information already known to him. Yet, if the reports are not reviewed and used, and if no request is made to the contractor for corrections where needed, the quality and therefore the usefulness of the data may be expected to deteriorate. The reports, therefore, need to be reviewed and evaluated before they are applied to a review and evaluation of contractor performance. Evaluation of the reports involves determining the "value," i.e. the significance, credibility, or worth of the data. This includes auditing and analyzing the data for internal consistency, and for consistency with the same category of reports for prior periods and with related reports for the current period.

Once the reports evaluation has established the credibility of the data, they may be used for an evaluation of the contract and project progress and status. This involves both analysis and synthesis. The purpose of such analysis and synthesis is to develop a picture depicting the progress vs. plan, the current status, and an estimate of continued progress toward successful project completion within that plan. It is the purpose of such a picture either to show that "all's well," or to call attention to actual or potential problems and to propose action leading toward their resolution. Such a picture, in addition to satisfying the normal management functions of the PM, will accommodate higher echelon program status reporting requirements. This handbook provides information which may be used for evaluating the credibility of the data, and for using that data to evaluate contractor performance, i.e. developing the picture which lead toward more effective management of DOE programs and projects. Part II of this Handbook covers techniques as they pertain to the UCRS Baseline Plans, while Part III pertains to UCRS Status Reports. Similar techniques pertaining to PMS (now CSCS) Cost Performance Reports are delineated in DOE publications RDD/PMS-4.

Part II. Project Baselines

The Uniform Contractor Reporting System (UCRS) is based on a management concept that provides for the establishment and control of project baselines against which the status and progress of the project can be measured and monitored. Baselines normally consist of the contractor's plans for each of the technical, cost, manpower (when required), and schedule areas of management concern and comprise, therefore, an integrated form of management information.

A. The Management Plan

As part of a proposal, a prospective contractor submits a Management Plan to delineate the manner in which the effort is planned to be managed and conducted. The plan provides the DOE Source Evaluation Board (SEB), consisting of technical, management, contracting, and financial experts, with a standard of comparison between competing sources and is an important aid in the selection process. The content and level of detail in the Management Plan may vary with the type of contract and the nature of the work involved; however, it must be sufficiently comprehensive so that the SEB and particularly the DOE Project Manager (PM) can understand how the contract will be managed and conducted. It is essential that the PM carefully review the plan and ascertain that the following points are addressed.

- The plan should include an adequate description of the contractor's organizational structure. The management structure should be specified by an organization chart and may contain a list of key personnel on the contractor's project team. The relationship of each position to its responsibility for contract performance should be delineated.
- The management processes the contractor will apply should be described, including a delineation of the tailoring of these processes to accommodate the project and the reasons why such tailoring is required; the procedures to be used in implementing the processes; internal documentation procedures; the trade study methods; the types of mathematical and/or simulation models to be used for system and cost-effectiveness evaluations; methods for the generation and control of specifications; the levels of control for performance and design requirements and the control methods to be used; technical program assurance methods; plans and schedules for technical reviews and program progress reviews, and for control of documentation.
- A Work Breakdown Structure (WBS) which divides and subdivides the requirements of the contract line into elements of manageable size and duration should be provided. The WBS methodology should logically extend the Program or Project Summary Work Breakdown Structure (PSWBS) as delineated by the DOE PM in the solicitation. The PM should ascertain that the Contract Work Breakdown Structure (CWBS) identifies the major end items needed to accomplish the contract objectives and that they relate to elements of the contract work statement. The Contractor should include tasks to the level desired by the PM and requested in the Reporting Requirements Checklist. Figure 1 shows an example Work Breakdown Structure, illustrating both a detailed WBS (to level 3 and, in two specific instances, to level 4) and a summary WBS (to level 2). The contractor should maintain his own data to a level lower than that reported to DOE. In this manner, problem areas identified in subsequent progress reports may be traced to their source. The PM needs to ascertain also that each descending level of the WBS represents an increasingly detailed definition of the work task and, conversely that all elements shown are subtasks or sub-elements of work listed under the task or element of which they are a part. (For large projects such as a major construction contract, a logic diagram of the work should be included.)

FIGURE 1
EXAMPLE WORK BREAKDOWN STRUCTURE

A. ORIGINAL SCHEMATIC

**B. AS USED FOR SUMMARY
PLANNING/REPORTING**

15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)
1.1	Site and Buildings
1.2	Utilities
1.3	Equipment
1.4	Systems
	Subtotal Contract (less G&A)
	General and Administrative Management Reserve
	TOTAL COST
	FEE
	TOTAL CONTRACT VALUE
B&R	76-4G
B&R	76-5H
22.	Total
23. Remarks	SUMMARY BY WBS
25. Signature of Contractor's Project Manager and Date	C. M. Doo <i>C. M. Doo</i>

**C. AS USED FOR DETAIL
PLANNING/REPORTING**

15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)
1.1.1	Land & Improvements
1.1.2.1	Foundations & Substructures
1.1.2.2	Superstructure & Finishing
1.1	Subtotal Site & Buildings
1.2.1	Sewage
1.2.2	Water
1.2.3	Electrical
1.2.4	H.A.C.
1.2	Subtotal-Utilities
1.3.1	Instruments & Controls
1.3.2	Fuel Equipment
1.3.3	Waste Handling
1.3.4	Fire Protection
1.3	Subtotal-Equipment
1.4.1	Test & Evaluation
1.4.2	Program Management
1.4.3	Data
1.4.4	Training
1.4	Subtotal-Sys. Integration
1.0	Subtotal Contract (less G&A)
	G&A
	Management Reserve
	FEE
	TOTAL CONTRACT VALUE
B&R	76-4G
B&R	76-5H
23. Remarks	DETAIL BY WBS
25. Signature of Contractor's Project Manager and Date	C. M. Doo <i>C. M. Doo</i>

- Milestone and cost planning data will normally be required as part of the Management Plan for all contracts. The requirement of a Manpower Plan is discretionary with the PM (see footnote, p. 8). The UCRS provides DOE forms for satisfying these requirements for planning data. They are discussed in subsequent paragraphs.* In negotiations with the successful bidder, the PM should ensure that plans are provided for each type (such as detail, summary, cost element, and organization element), to the level of detail specified in the solicitation, and for the entire period of contract performance. The plans should be in detail for near-term efforts and in larger increments for long-term efforts. The plans should include narrative explanations when appropriate. Objectives and milestones should be integrated into the Milestone Schedule and Status Report.
- The Management Plan should provide a discussion of the procedures the contractor will use to control contract and work changes and, if applicable, a description of his procedures for controlling, protecting, operating, and maintaining Government Owned Property. In reviewing the several control procedures, the PM should satisfy himself that each can achieve the desired control.

Negotiations with the successful bidder/proposer may result in modifications to parts of the Management Plan first submitted as part of the proposal as discussed above. To ensure that, for the type of contract under consideration, the final negotiated Management Plan holds promise of satisfactory contract performance, it is essential that the PM as a member of the negotiation team, thoroughly review and evaluate the several parts of the plan for credibility and feasibility, both as a viable, realistic plan per se and as a standard against which to monitor contractor performance. If it does not appear feasible that the plans can be accomplished, their acceptance could result in unsatisfactory cost or schedule variances or in a technically unsatisfactory product.

B. The Baseline Plans

Review and evaluation of the Milestone Schedule and Status Report (MSSR) and the manpower and cost baseline plans are discussed below. In addition, these plans should be reviewed in relationship to and in context with each other and there are some review questions which are pertinent to all:

- Are all plans required by the Reporting Requirement Checklist in the contract included with the management plan? To the level of detailed requested?
- Do the headings correctly identify the contract, the contractor, start and completion dates?
- Is the relevant information consistent in all documents (e.g. reporting categories, level of detail, reporting period)?
- Have the forms been signed by the contractor's representative to indicate that the information is a reasonable representation of the method by which the contractor will perform?
- Are the mathematics correct, e.g. additions of lines across, columns down? (Note exception—see paragraph B3).
- Is the time phasing of manpower utilization (when applicable) and of cost consistent with the schedule on the MSSR?
- In the Cost Plan by cost element, is the cost for labor shown consistent with the data in the Manpower Plan, when required?

*For contracts of low dollar value (under \$120K) or short duration (under 15 months), the Contract Management Summary Report (see III C of this Handbook) may be used as a baseline plan in lieu of separate milestone, cost, and manpower plans.

- When viewed together, do the plans provide an indication that the contractor understands the statement of work and that he is planning adequately for its accomplishment—within constraints of the contract.

1. *Milestone Schedule and Status Reports (MSSR)* are submitted on DOE Form 535 (see Figure 2). This form serves a dual purpose—first to establish the baseline schedule for achieving the objectives for each reporting category identified in the contract and, in subsequent periodic submittals, to report schedule status and planned or approved changes. It is normally accompanied by a Milestone Log which lists the events and milestones together with the planned completion date for each (see Figure 3).

When reviewing the MSSR as a baseline plan, the PM needs to assure himself that the schedule for each reporting category element is shown in sufficient detail to support an analysis of the contractor's schedule planning, and that status and progress can be monitored during the life of the contract. Critical milestones, indicated by a circle around the major milestone triangles, need particular attention.

- Is the level of detail (such as contract line items, tasks, or WBS elements) shown on the MSSR as specified in the solicitation? Is this detail sufficient to support analysis of schedule planning and subsequent contract status and progress?
- Are the number of intermediate events (depicted by inverted triangles above the activity bar) adequate, considering the complexity of the major milestone and the need for PM monitoring of the activity during contract performance, with a minimum of subjective judgement? Except in cases of true level-of-effort activities, long periods of time without any intermediate milestones should be considered unacceptable. For example a realistic question could be raised at the small number of intermediate milestone in WBS element 1.1.1 and the length of time between the intermediate events shown in Figure 2. Are the two shown sufficient for maintaining a track of this effort?
- Are milestone completion dates consistent with the contract requirement?
- Does the chart depict each specified task, project phase, or other element as required by the contract?
- Are the first twelve months charted in detail, with appropriate lesser detail for the entire remainder of the contract? Note that, in the example, milestones are provided monthly for the first 15 months, then quarterly, and finally for an entire FY, to accommodate the entire contract schedule.
- Have all critical events/major milestones been identified and plotted? (Compare the identification numbers and reporting categories in Figure 2 with WBS, Figure 1.) Do they take into consideration significant constraints and interfaces? It is necessary for the PM to understand what the interfaces and constraints are.
- Is a Milestone Log provided? Are deliverables clearly identified in the Milestone Log? Does it show scheduled completion dates for all intermediate events and critical milestones and are these listed by the same identifying number and name as on the MSSR? Please note in the example, Figure 2 and 3, that each intermediate event is listed in the Milestone Log and a planned completion date is identified.
- Based on the PM's knowledge of the project, does the schedule appear reasonable for the tasks at hand? Does the PM consider them capable of accomplishment within the planned time schedule? The answer to these questions in many cases depends upon the project manager's knowledge and experience and his familiarity with this and other contractors' efforts on similar projects.

FIGURE 2
MILESTONE SCHEDULE AND STATUS REPORT

FORM DOE 535
(11/78)

PAGE 1 OF 1

1. Contract Identification ENERGISTIC PILOT UNIT		2. Reporting Period 10/01/76 through		3. Contract Number 10-10-10-2(2222)													
4. Contractor Name, address BKVS INC. 3000 CONSTRUCTION BLVD. ANYPLACE, VA 22298		5. Contract Start Date 10/01/76		6. Contract Completion Date 06/01/80													
7. Identification Number	8. Reporting Category (e.g., contract line item or work breakdown structure element)	9. Fiscal Years and Months												FY 80	10. Percent Complete		
																a) Planned	b) Actual
		<div style="display: flex; justify-content: space-between;"> FY 77 FY 78 FY 79 </div> <div style="display: flex; justify-content: space-between; font-size: small;"> G N D J F M A M J J A S O N D Q2 Q3 Q4 Q1 Q2 Q3 Q4 </div>															
1.1.1	LAND IMPROVEMENTS																
1.1.2.1	FOUNDATIONS & SUBSTRUCTURES																
1.1.2.2	SUPERSTRUCTURE/FINISHING																
1.2.1	SEWAGE																
1.2.2	WATER																
1.2.3	ELECTRICAL																
1.2.4	HAC																
1.3.1	INSTRUMENTS AND CONTROLS																
1.3.2	FUEL EQUIPMENT																
1.3.3	WASTE HANDLING																
1.3.4	FIRE PROTECTION																
1.4.1	TEST AND EVALUATION																
1.4.2	PROGRAM MANAGEMENT																
1.4.3	DATA																
11. Remarks BASELINE DATA																	
12. Signature of Contractor's Project Manager and Date C. M. DOO										13. Signature of Government Technical Representative and Date M. A. WATCHER							

FIGURE 3
MILESTONE LOG

10-10-10-2 (2222)
CONTRACT NO

IDENTIFICATION NO	DESCRIPTION	PLANNED COMPLETION DATE	ACTUAL COMPLETION DATE	COMMENTS
1.1.1.A	Demolition/Clearing	12/20/76		
1.1.1.B	Excavation	05/20/77		
1.1.1	Complete All Land Improvements	06/15/77		
1.1.2.1.A	Hot Sump	02/19/77		
1.1.2.1.B	Liner and 1st Slab	03/15/77		
1.1.2.1.C	Complete Foundations	08/10/77		
1.1.2.1	Complete Foundation/Sub Structures	03/31/78		
1.1.2.2.A	Complete Superstructures	03/20/78		
1.1.2.2.B	Complete Exterior Finishing	09/30/78		
1.1.2.2	Complete Finishing	05/15/80		
1.2.1.A	Trench & Drains Complete	03/31/77		
1.2.1.B	Complete Filtration System	09/15/77		
1.2.1	Complete Installation of Sewage	06/10/78		
1.2.2	Complete Installation of Water	09/30/78		
1.2.3.A	Complete conduit and Main Power Inst.	03/10/78		
1.2.3.B	Complete snaking & batt	06/12/78		
1.2.3.C				

2. *Manpower Plans* may be required to provide time-phased baselines for the planned rate of direct labor use.* They serve the purpose of forecasting contract manpower requirements and for measuring labor performance. Manpower may be planned by WBS—to whatever level may be required contractually—and/or by labor category. An example of a Manpower Plan by WBS level 3 and by labor category is shown in figure 4. The following comments are annotations to the example in figure 4:

- ① For the current fiscal year, a separate column is used for each month.
- ② If the work effort extends more than 5 years beyond the current fiscal year, the planned manpower for the 6th future year and beyond will be shown for each reporting category element.
- ③ On the Detailed Manpower Plan, a subtotal is provided for each summary element (in this case, the second-level work breakdown structure elements). This subtotal is an input to the Summary Manpower Plan when required.
- ④ Normally, the unit of measure is expressed in manhours or manmonths. If manmonths are used the contractor should provide a description of the conversion used.
- ⑤ The planned manpower totals must be identical in the various types of plans submitted.
- ⑥ The date must be that of the baseline plan being established and must be shown in subsequent Manpower Management Reports, if required.
- ⑦ The data in column 8 of the current FY manpower plan must reflect the sum of the approved plans for prior fiscal years. The data in column 9 must be the actuals for all prior fiscal years as reported in the Manpower Management Report.

In evaluating Manpower Plans, questions such as the following need to be considered:

- Does the solicitation/contract contain a manpower ceiling by fiscal year or by contract total? If so, is the planned manpower within that ceiling?
- Do Manpower Plans reflect all requirements specified in the Reporting Requirements Checklist regarding the level of detail, etc.? Do the upper WBS level plans correctly summarize lower level plans? (For example, Figure 4, the sum of data in lines 1.3.1 through 1.3.4 must equal the data in line 1.3).
- Does the Manpower Plan by WBS element support the schedule for these elements? In other words, does the planned manpower appear adequate, too low, too high to meet the schedule? (Compare data in Figure 4 with schedule in Figure 2).
- When required by the solicitation, is a Manpower Plan by labor category included? In this plan, are the skills balanced, e.g., is there an appropriate mix of engineering manpower and other direct labor? Does engineering manpower reach a peak prior to other direct labor, see Figure 4. Does the balance of skills appear to support the identified task? An obvious question in the example in Figure 4 is what happens after March 1978 to cause the reduction in manpower? It may be possible to derive an explanation by an analysis of the Manpower Plan together with the Milestone Schedule.

*Manpower plans should be used only when manpower data and their analysis can serve as an important indicator of adequate project planning toward meeting established goals. The cost of such data should be weighed against their value to the Program Manager.

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②

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- Does the Manpower appear to fluctuate from one month to another to a degree not warranted by the schedule milestones, or does it build up smoothly to the peak required by the project and its schedule and then decrease smoothly to contract completion? The example, Figure 4, shows the second year manpower plan for a project; however, one might question the immediate application of 14,200 manhours on WBS element 1.1.2.2 in the first month with no build-up and no leveling off.
- Refer to block 16 and be sure the manpower units are identified and understood.
- Based on the PM knowledge of the contractor and the project, does the contractor have to hire manpower to fulfill his plan or does he have them on hand? Is this manpower readily available in the work site locality?

3. *The Cost Plans* establish the planned rate of accrued costs for each required reporting category for the life of the contract. They serve as the basis for forecasting fund requirements and for measuring cost performance. Cost is planned on a summary basis (WBS level 2), in detail (WBS level 3 or lower, as required by the solicitation and negotiated at award with the contractor), and/or by cost element. For construction projects, cost plans may be submitted by construction element. An example of a Cost plan by WBS level 3 and by cost element is shown in Figure 5. The following comments are annotations to the example in Figure 5:

- ① Costs are normally spread in detail by month for the current fiscal year and form the detailed cost baseline for that year.
- ② If the work effort extends more than five years beyond the current fiscal year, the planned cost for the sixth future year and beyond will be shown for each reporting category element.
- ③ On the Detailed Cost Plan, a subtotal is usually provided for each summary element (in the example, the second-level WBS elements). This subtotal is the input to the Summary Cost Plan when required.
- ④ Separate lines may be required for overhead, general and administrative costs (G&A), for fee, and for other breakouts. In the example, Figure 5A, the overhead is included in the figures for individual WBS elements (see "subtotal" line). In Figure 5B, the overhead is broken out separately. For Column 8, for example, the "Subtotal Energistic Pilot Unit," Line 1.0, in Figure 5A is \$7,628,000; the total direct cost and the overhead in Figure 5B are \$5,270,000 and \$2,358,000 respectively for a total of \$7,628,000. In both examples, G&A are shown separately.
- ⑤ The total costs assignable to each DOE B&R Number are shown on the bottom lines of this section for all cost plans. *These are non-add figures.* The total allocation by B&R Number and the elements to be included must be a part of the contract and is supplied by DOE.
- ⑥ Cost sharing information, when required, may be shown immediately below the total for all items (including fee). Separate lines may be used to show each organization's share, such as DOE, Company A, Company B, etc.
- ⑦ When the contractor uses a contingency account or management reserve, a separate line identifying this will be provided. This is not time-phased and the Total Contract Cost and Total Contract Value data in Col. 13 will not equal the horizontal sum of the data in Col. 8 + 10 + 11 for these same lines. The difference should be the amount of management reserve.
- ⑧ The planned Total Contract Cost and Total Value must be identical in the various Cost Plans submitted.
- ⑨ The unit of measure must be identified.

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B. BY COST ELEMENT

FORM DOE 533P
11 /RI

Contract Identification																7 Contract Number									
Energetic Pilot Unit																10-10-10-2 (2222)									
Contractor Name, address																A Contract Start Date									
BKVS Inc.																10/01/76									
3000 Construction Blvd. Anyplace, VA 22209																C Contract Completion Date									
																06/01/80									
B Identification Number	7 Reporting Category (e.g., contract item or work breakdown structure element)	8 Planned Prior Fiscal Years	9 Actual Prior Fiscal Year	FY 78																11 Planned Future Fiscal Years				12 Planned Subsequent Fiscal Years to Completion	13 Total Planned Cost (Columns B 10, 11, and 12)
				O	N	D	J	F	M	A	M	J	J	A	S	Total	* 79	P 80	C	d	e				
Labor		2774	2823	378	459	459	459	459	459	250	250	250	250	250	250	4173	1726	510						\$163	
Material		199	199	11	15	13	10	13	9	10	9	8	8	7	3	116	12	2						329	
Equipment		-	-	-	20	83	27	39	48	38	17	23	38	84	91	508	572	33						1113	
SubContracts		2276	2601	399	340	279	338	323	319	161	182	176	162	117	114	2911	712	271						6170	
Other Direct Costs		21	26	2	2	2	2	2	1	1	2	3	2	2	2	23	13	7						84	
TOTAL DIRECT COSTS		5270	5649	790	836	836	836	836	836	460	460	460	460	460	460	7731	3035	823						16859	
Overhead		2358	2400	321	390	390	390	390	390	213	213	213	213	213	213	3548	1467	433						7806	
G&A		1045	1103	153	168	168	168	168	168	92	92	92	92	92	92	1545	617	172						3379	
Management Reserve		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						*1188	
TOTAL CONTRACT COST		8673	9152	1264	1394	1394	1394	1394	1394	766	765	765	765	765	765	12824	5119	1428						29242	
FEF		260	274	38	42	42	42	42	42	23	23	23	23	23	23	386	153	43						877	
TOTAL CONTRACT VALUE		8933	9426	1302	1436	1436	1436	1436	1436	788	788	788	788	788	788	13210	5272	1471						30119	
B&R	76-GG	3573	3770	521	574	574	574	574	574	315	315	315	315	315	315	5281	2109	588						12048	
B&R	76-HH	5360	5656	781	862	862	862	862	862	473	473	473	473	473	473	7929	3163	883						18071	
14. Total																									

15. Remarks		16 Dollars Expressed in THOUSANDS		17. Cost Plan Date	
COST ELEMENT				07/28/77	
Amount is contingency and is available for use in current FY if needed.					

18 Signature of Contractor's Project Manager and Title		19 Signature of Contractor's Authorized Financial Representative and Date		20 Signature of Government Technical Representative and Date	
C.M. Ooo [Signature]		J.M. Counter [Signature] _____ _____		M.A. Wretcher [Signature] [Signature]	

- ⑩ The date must be that of the baseline plan being established and must be shown in subsequent Cost Management Reports.
- ⑪ The data in Col. 8 of the current FY Cost Plan must reflect the sum of the approved plans for prior fiscal years. The data in Col. 9 must be the actual cost for all prior fiscal years as reported in the Cost Management Report.

A number of questions need to be raised by the PM, not all of which can be answered by looking only at the cost plan. They require a familiarity with the contract and close contacts with the contractor's project manager.

- Are Cost Plans included as specified in the contract, on a summary and/or detail WBS level and/or by cost element? Do the totals of Cost Plans by WBS agree with those of the Cost Plan by cost element? Is a Cost Plan by construction element provided for construction projects?
- Is the total planned cost (Col. 13) within the project budget constraints for each fiscal year? For the total project?
- Have the amounts planned for G&A and for overhead been included with the cost for each WBS/cost element or are they shown in separate lines? Have rates been approved by the Government?
- Considering the type of contract and the risk involved, does the contractor's fee appear reasonable? How does it compare to the fee in other similar contracts?
- Has a Management Reserve been provided for contingencies and does the amount appear reasonable? Such factors as type and duration of contract, risk involved, previous contractor performance, and other factors must be taken into consideration. In the example, the contractor still has approximately 4% of the total contract value as management reserve.
- Have the DOE B&R numbers been listed correctly and have the costs assignable to each been shown?
- Does the cost appear to have been time-phased properly; does it reflect the schedule? This is particularly important in the Cost Plan by cost element where the application of labor and material can be related approximately to the schedule. The data for cost of labor should be related also to the Manpower Plan, when such a plan is required. The data for cost of material should be analyzed to determine whether material has been costed when received in stock, or when applied to a contract task.
- Is there evidence of "front loading"—i.e., overbudgeting in the early part of the contract, leaving insufficient funds for downstream efforts when compared with scheduled requirements. This practice is apt to result in problems later and, in the meantime, prevents meaningful evaluation of contract performance. A conscious effort must be made to assure the planning is realistic and adequate for the tasks at hand, near-term as well as future effort.

C. The Updated Baseline Plans

The discussions in preceding paragraphs have been in reference to Baseline Plans as originally submitted by the contractor on the basis of proposal and post-award negotiations. However, the UCRS Guidelines require annual updates of the baselines to be submitted 60 days prior to the beginning of each new fiscal year. These annual updates are limited to a monthly detailing of the existing plans for future fiscal years and do not authorize a change to the baselines. (With DOE's consent, contracts that overlap the fiscal year by a short period may not require the revision to the Cost Plan, Manpower Plan, and Milestone Schedule and Status Report at the start of the new fiscal year.)

- The PM should ascertain whether baselines are updated to show all negotiated modifications, and/or whether they include those items for which a change is authorized but has not been negotiated.
- Revised baselines should be submitted within 30 days following major negotiated contract changes. DOE must approve the new baseline plans before they become a part of the contract.
- Proposals for contract modifications must be reviewed and the impact of the proposed revisions on all affected baseline plans must be evaluated, including those of other contractors on the same program/project.
- Baseline revisions for reasons other than Government-directed changes are subject to negotiation as specified in the contract modifications clause of the contract.
- Deviations from baseline plans need not be a basis for baseline revisions. However, if the contractor's plans become unrealistic, replanning may be necessary, but requires DOE approval. The DOE PM must then carefully review the changes which the contractor identifies as required. The contractor may use the Project Status Report (see III.B) as the vehicle for requesting DOE approval for replanning. Before approving replanning, the PM should ascertain whether the changes are realistic and whether they are within fiscal year funding limitations or total obligation authority.
- The contract should require the contractor to maintain the records necessary to support changes reported to the Government.
- Revisions or changes to the technical baseline should be documented by the Government with changes to the Contract Work Statement, specifications, drawings, or other documents when applicable. When a significant change in technical approach is involved, the PM should require appropriate changes to be made to the contractor's Management Plan.
- In some cases, changes in technical direction may cause distortions in the Schedule and the Cost and Manpower Plans, such as when an effort in one direction is found to be unproductive and a complete change of direction is mandated. In some instances, tasks may disappear with no products resulting from them, yet the actual expenditures remain. In other cases, the total cost of efforts may appear out of line because the original approaches were abandoned while the task and its results remain. In such instances, a revised baseline document should include an attachment to explain the historical data in terms of original baseline plans, to avoid misunderstandings at a later date.

When evaluating an annual submittal of the Manpower Plan or the Cost Plan, the PM should review for the following:

- Do the new plans reflect all authorized changes and only authorized changes?
- Do the data in column 8 of the current Manpower Plan and Cost Plan reflect the data in columns 8 + 10 of the previous approved plan? Are the data in column 9 identical to the actual manpower and actual cost reported in the Manpower Management Report and the Cost Management Report respectively (see annotation 7 in Figure 4 and annotation 11 in Figure 5)?
- Are the data in column 10 (Total), of the current Cost Plan identical to planned cost as shown in column 11a of the previous approved plan?
- The annual update should show a time-phasing of the costs shown in the prior approved plan under "Planned Future Fiscal Years."
- Do the updated costs represent an altered baseline budget to cover past, current or near-term effort? Has the baseline been altered unilaterally or does it have prior DOE approval?

Part III. The Status Reports

A. Introduction

1. The status reports provide the PM with much of the information he requires to monitor the contract progress. The reports show project cost and manpower accruals, schedule progress, and total project status to date. When two or more contractors are involved in a project, the uniform reports provided by the UCRS will enable the PM to assimilate the data from all reporting contractors more readily and thus to derive a more comprehensive evaluation of the entire project. The reports serve the PM in evaluating performance on contracts in terms of what has been accomplished technically, at what cost in time and dollars, and what may be the impact on the future status of the project. As work progresses and trends become apparent, the reports become more and more helpful to the PM in his search for answers to such question as: Has the progress been favorable and if so, can such a trend be maintained? If unfavorable, can it be reversed? Changing an unfavorable trend depends, to a considerable extent, on the response time involved. At each level of management, the built-in lag increases. At the PM level, there is a danger of too long a continuation of an unfavorable trend unless the effort can be monitored and controlled in a timely fashion. The usefulness of the status reports, therefore, depends not only on the credibility of the data, but also in the timeliness of their submittal. This, in turn, depends on the contractor's dedication to the reports' purpose and the PM's insistence on such dedication. The PM should maintain a check-off list or tickler file to assure timely receipt of UCRS reports in accordance with requirements identified on the Reporting Requirements Checklist.

2. An evaluation of the UCRS reports is an essential first step leading to a fulfillment of the PM's responsibility for project evaluation and control. Additionally, it provides inputs for reports to or briefing of higher echelons and documented progress assessments as a basis for progress payments. This section provides guidance to the project management team for analyzing and integrating the data from the various status reports into an overall assessment of contractor performance and of project status. The basic report of the UCRS is the Project Status Report, a narrative assessment of the overall progress and status of the contract by the contractor's project manager. It is supported by the Contract Management Summary Report, a concise graphic summary of contract cost, manpower, and schedule performance, and by a more detailed Milestone Schedule and Status Report, Manpower Management Report, when required, and Cost Management Report. The status reports are directly related to the project baselines discussed in the previous section. This relationship is depicted in Figure 6. The technical reports, though not shown in this figure and not discussed in detail in this manual, are of considerable importance to the PM and to the evaluation of his project. They provide detail on scientific and technical progress and on problems which, normally, are only highlighted in the Project Status Report. The initial step of a project status review should be a careful reading and comprehension of the Project Status Report (PSR), jointly with the Contract Management Summary Report (CMSR). When reviewed together, these two documents provide the means for rapidly assessing the project status on a summary basis.

FIGURE 6
RELATIONSHIP OF STATUS REPORTS TO PLANS

B. The Project Status Report (PSR)

1. This is a concise narrative assessment by the contractor's project manager of the status of the contract. When properly accomplished, it can be most useful to the DOE PM as a tool for monitoring contract status and as an early indication of potential problem areas. The PSR highlights technical accomplishments, variations from management baselines or the technical approach, and actual or anticipated problems and actions taken or proposed to resolve them. The PM should expect a personal assessment of the current situation by the contractor's project manager, including a forecast of the near future and any impact on project accomplishment. No DOE form is provided for this report. However, in its heading, the report should identify the report title, number and date, the period covered, contract and contractor identifications, and contract start and completion dates. The body of the report should provide the PM with the information listed in Figure 7 and delineated in greater detail below.

**FIGURE 7
OUTLINE OF PROJECT STATUS REPORT**

1. CONTRACT OBJECTIVE CHANGES
2. TECHNICAL APPROACH CHANGES
3. CONTRACT TASKS
 - A. ACHIEVEMENTS
 - B. PROBLEMS/VARIANCE
 1. CAUSE
 2. EFFECT ON CONTRACT PERFORMANCE
 3. PROPOSED SOLUTION
 4. IMPACTS ON OTHER TASKS OR ASPECTS OF THE WORK
4. OPEN ITEMS
5. SUMMARY STATUS ASSESSMENT AND FORECAST
6. CONTRACT COST CHANGE RECONCILIATION

- a. Contract Objective Changes—Any modifications to the contract objectives that occurred as a result of a change during the reporting period. The PM may want to ask such questions as: Do the modifications reflect the implementation during the report period of directed changes? Does the contractor's understanding of these changes agree with the DOE interest and direction?
- b. Technical Approach Changes—This section of the PSR should identify changes in technical approach taken by the contractor whether DOE-directed or contractor-initiated. The PM should ascertain whether such changes have been depicted adequately either by flow diagrams, sketches, schematics and drawings or in narrative form when visuals are not appropriate. What impact may these changes have on the project? Does it appear that the contractor has identified all specific items for variance or problem discussion? Does the magnitude of variances in specific areas indicate a need for further control in these areas?
- c. Contract Tasks—The report should provide a discussion on only those specific contract tasks on which achievements during the report period warrant reporting, or on which significant variances or problems have been encountered. Normally the contract specifies a threshold for variances; reports should be required on only those which exceed such threshold. However, for significant problems or variances exceeding the threshold a systematic analysis is necessary to assess the causes, the effect on continued effort on this task as well as on other tasks, and the proposed solutions. The impact which these proposed actions have on contract performance, on cost, on schedule should be assessed.

- d. Open Items—Affords the contractor an opportunity to identify items on which action needs to be taken by either the contractor or the Government. This section could be used to report on items which are late or are awaiting action as a result of a conference or meeting. The DOE PM, for example, may have to provide guidance or obtain a decision from higher echelons on matters affecting the cost, schedule, manpower, or technical performance of the project. It is extremely important that the PM pay particular attention to this section.
- e. Summary Status Assessment and Forecast—The contractor's summary assessment and forecast should be carefully reviewed by the PM as a key basis on which to determine the status of the project and its future direction.
- f. A contract cost change reconciliation should be included as part of the PSR only for the period in which an authorized change in contract value occurs. This should show the original contract value and list all prior supplemental agreements plus the current changes being incorporated to derive the new present value. Changes which have been authorized but not finalized should also be identified—additions of their value to the present contract value will provide a new contract estimate. The PM should ascertain whether the contractor has included proposed contract changes which have not been submitted to or approved by DOE.

2. The DOE UCRS Guidelines provide examples of both a Project Status Report and a Change Reconciliation. If the PM understands the significance of the information provided in these reports, he may be better able to consider alternatives that may correct a problem situation and bring the contractual effort back closer to the original goals. In the expectation that a problem can be resolved before the next report is due, a contractor may at one time or other fail to identify such a problem in the PSR. The DOE PM nevertheless may be able to determine that there is an actual or potential problem by an analysis of the more detailed UCRS reports, by visits to the contractor's facility where the work is being performed, and by close contact with the GTR and with the contractor's project manager. Integrating information from various sources will improve the chances that all areas of impact have been considered and that the PM's assessment of the project status will be on a sound basis.

C. Contract Management Summary Report (CMSR)

1. The second report used in the initial assessment of the contractor's progress is the CMSR. This provides a concise, top level summary of performance against the baseline plans. The single page, graphic presentation (plus supporting data on the form) permits rapid visual trend analysis as well as comparison of actual cost and manpower vs. plan and milestones achieved vs. scheduled.

2. An example of a CMSR is provided in Figure 8. The following comments are annotations to the example:

- ① The cumulative planned cost and manpower are shown by a broken line for the designated period. This must represent the latest approved baseline plan.
- ② Cumulative actual cost and manpower are shown by a solid line through the reporting period, i.e., up to the vertical "time-now" line.
- ③ A dotted line indicates the contractor's current estimate of cost and manpower expenditures for subsequent months shown on the report.
- ④ The approved plan and current estimate of cost and manpower lines are extended for the first three months of the subsequent fiscal year.
- ⑤ The cumulative funds obligated and manpower lines (heavy solid lines) represent authorized dollar and manpower ceilings, when applicable, which cannot be exceeded by the contractor.
- ⑥ Scales identified to the left of the graphs should be chosen so as to provide as clear a picture as possible in the space provided.

FIGURE 8

CONTRACT MANAGEMENT SUMMARY REPORT

FORM DOE 536
(1/78)

FORM APPROVED
OMB NO. 38R-0190

1. Contract Identification ENERGISTIC PILOT UNIT				2. Reporting Period 09/02/77 through 09/30/77				3. Contract Number 10-10-10-2 (2222)					
4. Contractor (Name and Address) BKVS INC. 3000 CONSTRUCTION BLVD. ANYPLACE, VA 22299								5. Contract Start Date 10/01/76					
								6. Contract Completion Date 06/01/80					
7. Months <div style="display: flex; justify-content: space-around; font-weight: bold;"> ONDJFMAMJJASOND </div>												8. FY 77	

9. Cost Status		a)	14000													9. Cost Plan Date 10/01/76
			13000													
THOUSANDS OF DOLLARS		b)	12000													11. Actual Costs Prior FYs N/A
			11000													
B&R Numbers		c)	10000													13. Total Contract Value 30119
			9000													
76-4G 76-5H		d)	8000													15. Estimate for Subsequent Reporting Period 1302
			7000													
Accrued Costs		e)	6000													16. Total Contract Manpower 12443
			5000													
Planned		f)	4000													17. Total Contract Manpower 12443
			3000													
Actual		g)	2000													18. Total Contract Manpower 12443
			1000													
Cumulative		h)	0													19. Total Contract Manpower 12443

10. Manpower Status (Direct Labor)		a)	7000													10. Manpower Plan Date 10/01/76
			6500													
HUNDREDS OF MANHOURS		b)	6000													12. Actual Manpower Prior FYs N/A
			5500													
Planned		c)	5000													14. Total Contract Manpower 12443
			4500													
Actual		d)	4000													15. Total Contract Manpower 12443
			3500													
Cumulative		e)	3000													16. Total Contract Manpower 12443
			2500													
Planned		f)	2000													17. Total Contract Manpower 12443
			1500													
Actual		g)	1000													18. Total Contract Manpower 12443
			500													
Cumulative		h)	0													19. Total Contract Manpower 12443

11. Major Milestone Status											
a. 1.1.1.A DEMOLITION CLEARING											
b. 1.1.2.1 FOUND. SUBSTRUCTURES											
c. 1.1.2.1.B COMPLETE LINER/1ST SLAB											
d. 1.1.2.1.C COMPLETE FOUNDATIONS											
e. 1.2.1.A COMPLETE TRENCHES/DRAINAGE											
f. 1.2.1.B FILTRATION SYSTEM											
g. 1.2.2 WATER											
h. 1.4.1 TEST & EVALUATION											
i. 1.4.2.C COMP. SUB SYS. SPECS.											

12. Remarks	

13. Signature of Contractor's Project Manager and Date <div style="text-align: right;"><i>C.M. Koo</i></div>	14. Signature of Government Technical Representative and Date <div style="text-align: right;"><i>m. water</i></div>
---	--

- ⑦ Selected milestones shown in the lower graph of the CMSR should be the most important and significant to upper-level management and could be some of the more important intermediate, near-term milestones from the Milestone Schedule and Status Report. They may represent also major milestones or supporting milestones scheduled to be accomplished during the period covered by the report and, therefore, selected for review.
- ⑧ The bars shown open through the end of the period represent milestones not scheduled for the current report period. Estimated dates for the accomplishment of these milestones are shown in the column to the right of the schedule.
- ⑨ Supporting data are shown in spaces to the right of the graphs.

3. In reviewing the credibility of CMSR data, questions such as the following need to be considered:

- Has all the identifying information (contract, contractor, dates) been shown correctly in the heading of the report?
- Have appropriate scales been chosen for the cost and manpower graphs and have they been properly identified (e.g., "Thousands of Dollars," "Hundreds of Manhours")?
- Have all the blocks to the right of the cost and manpower graphs been filled in correctly?
- Have the B&R numbers been identified correctly in the block provided on the cost graph?
- Do the tabulated data beneath the graphs appear correct?—In comparison to the previous CMSR, whether submitted as a Baseline Plan or as a Status Report? In comparison to the Manpower Management Report and the Cost Management Report, this report period? Have they been plotted correctly in the graphs? Has the contractor included current best estimate (dotted line) of continued cost and manpower for subsequent months? Have the variances been calculated correctly and are unfavorable variances shown in parentheses?
- Are the Milestones shown among the most important ones contained in the Milestone Schedule and Status Report and agreed to by the DOE PM? Have they been correctly plotted? For events not scheduled for completion during the report period, are the planned completion dates shown to the right of the graph?
- Has a vertical "time-now" line been included?
- Has the report been properly signed and dated?

4. An evaluation of the report, additional to the review of the data for credibility, must be undertaken:

- Are there any variances? These should be obvious from the graph, but should be reported separately also in the spaces provided below the chart. Has there been a trend of variances in the past? Does the current estimate of cost and manpower expenditures for subsequent months indicate a continuation of this trend? In the example, Figure 8, both Cost and Manpower data show early favorable variances, giving way later to unfavorable variances which continue through the end of the period. Do the data predict an impending cost overrun, an impending behind-schedule situation? What are the causes behind the variances? Has the contractor addressed the problem in the PSR?
- Does the PSR identify a need for correcting data contained in previous reports and if so do the actual costs reported for the current period include appropriate adjustments? Do the data for estimated costs for subsequent months reflect the contractor's latest estimate? Are the planned cost data for the current period correct and in concert with the cost data in the current Cost Plan? Have all outstanding commitments attributable to this contract been included in block 9m, and not recorded as an accrued cost?

- Does a comparison between contract value (block 9k) and contractor's estimate at completion (block 9j) indicate a cost overrun? This is an important piece of information which warrants careful PM attention. Significant variances or variances exceeding the negotiated thresholds should be explained in the PSR. If they are not explained, or explained inadequately, a conference with the contractor's project manager may be desirable. In the example, Figure 8, the contractor predicts a cost underrun. Yet, to date, the report shows actual cost and current cost estimates for the next three months above planned cost and a number of milestones behind schedule. This may not be a problem—the contract still has some time to run—but this type of possible conflicting reporting should be thoroughly reviewed, analyzed, and made the subject of discussion with the contractor's project manager.
- Is the obligated funding adequate, based on current cost and estimated costs through the end of the period? If not, how can the problem be resolved? Can the scope of the effort be reduced, the schedule delayed, additional funds made available?
- What is the status of manpower application? Does this show a variance and how does this compare to the cost variation? Could manpower be a cause of cost overrun or of behind-schedule status? If so, might the wrong mix of labor categories be applied? Or has labor build-up been too slow or too rapid to be productive? In the example, Figure 8, the actual manpower buildup was slower than planned for the first three months of the effort. Beginning with the fourth month, actual manpower applied to this effort is consistently above the planned manpower. Do these data indicate unsatisfactory labor utilization?
- What is the schedule status? Do the data signify a behind-schedule situation? Is there a trend of milestone delays or is the trend toward schedule recovery? If a schedule problem is apparent, has it been fully addressed in the PSR? The PM should find in the PSR explanation for all significant variances and problems, actual or potential, which become apparent from an analysis of the CMSR. If such variances and problems are not explained in the PSR, an explanation should be sought from the contractor's project manager.

5. In the example, Figure 8, a cumulative cost overrun began during the month of March and has continued in an increasing trend up through this reporting period, with continuing manpower variances (Block 10d) being a contributing factor. As of now, a total cost variance of \$493,000 exists for the contract. (The unfavorable variance is indicated by parentheses.) To complicate matters further, the schedule information indicates a schedule slippage of one month for Task 1.1.2.1, Foundations and Substructures (note that the bar for this activity has not been shaded in to the "time-now" line). Additionally, two major milestones—1.1.2.1.B and 1.4.2.C—were not achieved in the time scheduled—see open triangles. Despite this unfavorable condition in the three charts of Figure 8, the contractor states in block 9j that his final costs will be below the contract value (block 9k). These variances should be fully addressed by the contractor in the Project Status Report and may require a more detailed analysis of the more detailed Milestone Schedule and Status Report, Manpower Management Report, and Cost Management Report (See paragraphs III.D, E, and F below). The relationship of the CMSR to these reports is depicted in Figure 9. The detailed analysis of these reports may indicate a need for further detailed reporting by the GTR and/or a visit by the PM to the contractor's facility or work site and a meeting with his project manager.

D. Milestone Schedule and Status Report (MSSR)

1. The DOE Form for this report, having the dual purpose of planning and status reporting, has been discussed as a planning report in paragraph II B1. As work progresses and as the scheduled time for the accomplishment of a milestone is reached, the bars and some of the symbols are shaded in to identify the extent to which the milestones are actually achieved. Additionally, new symbols may be introduced, such as a diamond for denoting a rescheduled milestone. The symbology and charting conventions, prescribed by DOE, provide the means to show activities which are ahead of schedule or behind schedule, as well as early or late completion of milestones and events. Because of the ease with which these charts provide a quick overview of the schedule status, the PM should require the contractor to follow these conventions and should himself be familiar with them. They are shown in Figure 10.

FIGURE 9

CMSR/MANAGEMENT REPORT RELATIONSHIPS

FIGURE 10
CHARTING INFORMATION — CONVENTIONS

CONVENTIONS

- 1 - Blacked-in figures or bars are used to show work done.
- 2 - Open figures or bars show work not done.
- 3 - △ (Major milestone) is twice as large as ▽ or ▲ (intermediate event).
- 4 - Under no condition should more than one △ (major milestone) be shown on a single horizontal line. (See Examples D and F for a method of denoting a rescheduled major milestone ◇; the number "1" indicates the first rescheduling.) Normally the original symbol △ would be shown with the latest rescheduled date (a ◇ with an associated number). In certain cases, where it is desired to show a complete history of rescheduling, a series of ◇'s with associated frequency numbers might be shown as in Example K. If it is not desirable to retain the rescheduling history DOE may request that only the current approved major milestone be shown.
- 5 - Symbols for milestones may be used alone, with an activity bar, or with a time line as the preparer judges best.
- 6 - Intermediate events may be shown only in association with an activity bar or a time line. These event symbols are placed above the bar or line and each is labeled for identification. A description of each intermediate event should be provided in an attachment to the Milestone Schedule and Status Report. One of the two methods is used to show when intermediate events are completed.
 - a - If the event is completed on time, it is blacked-in as shown above (see Example G Event A).
 - b - If the event is completed early or late, the symbol for the intermediate event is inverted (▲) and shown below the line or activity, identified in the same way as the original. The originally planned completion date above the line is left open (not blacked-in) and the deviation to it (below the line) is blacked-in (see Example H, Event A).

2. The main objective in performing a schedule analysis is to confirm the status of the project's progress. The MSSR graphically depicts the planned schedule and events, and tracks the progress made against the plan each month. Intermediate events and critical milestones are identified on a Milestone Log which accompanies the MSSR. The schedule is prepared to the specified level of detail (e.g., contract line items, tasks, products, or work breakdown structure elements). It addresses each specified task breakout, project phase, or other work elements required by the contract for inclusion in the plan. The report should be used in connection with an analysis of the technical status as shown in the PSR and other technical reports. Major technical problems will invariably cause deviations from the plan and may be expected to show up in the MSSR charts. When the PM has accomplished his comparative analysis of schedule and technical status, he is in a better position to consider alternative actions as necessary for schedule recovery. Such considerations, however, must be taken within the context of all baselines and as such must be addressed in order of priority.

3. An example of an MSSR, used as a status report, is provided in Figure 11. Its associated Milestone Log is depicted in Figure 12. The following are annotations to the example:

- ① Blacked-in figures and activity bars are used to show work completed. The vertical dashed line is a time-now line as of the end of the reporting period. From this chart, it may be seen that a number of milestones in the example are behind schedule (the blacked-in portion of the bars do not come up to the time-now line), while others are ahead of schedule (the bars are blacked in past the time-now line).
- ② The "Percent Completion" data represents the work that has been accomplished as a percent of the work that was planned for that reporting category. It is imperative that sufficient milestones are developed during the planning phase to minimize subjective estimates of completion. "Percent Completion" data may be derivable relatively easily in such efforts as building a brick wall. For example, if a bricklayer is to build a wall 4 feet high and by the reporting date has completed 3 feet, simple division results in a 75% completion figure. In most efforts for which DOE contracts, a percent completion figure is not that readily obtainable. It will not do, for example, to assume that when 75% of the time has elapsed or 75% of the man-hours scheduled have been expended, 75% of the job is completed. Engineering and other intangible activities are far less straightforward than bricklaying, and much more difficult to assess in terms of progress achieved quantitatively. An individual engineer, for example, may have used less than the best judgement when he gave his progress report. However, when assessing progress on a task with a number of individuals employed on a number of different sub-tasks, the subjectivity of a single assessment may be reduced considerably or may be eliminated. On such efforts with multiple subtasks, the assessment will reflect the combined judgement of all individuals involved, including the head of the department or cost center. Also, as work progresses, the judgement of these individuals and, therefore, their assessment will improve and the estimate of percent complete will become more and more reliable. In Task 1.1.2.1 of the example, the contractor had planned to complete 42% of the Foundations and Substructures, an activity involving four subtasks as indicated by triangles above and below the activity bar and identified by entries in the Milestone Log. Against this plan, the contractor reports a 40% completion of the task. This behind-schedule condition is apparent also from the chart where the activity bar for this WBS element is not blacked in up to the time-now line. (Planned percent complete data are mandatory on construction contracts.)
- ③ The completion schedules of intermediate events are indicated by triangles together with alphabetical identifications. Their planned and actual completion dates are shown in the Milestone Log. In the example, intermediate event A of the "Land Improvements" milestone—1.1.1—was completed on schedule, as indicated by the blacked-in triangle above the activity bar; intermediate event B was completed late, as indicated by the open triangle above the activity bar at the original schedule in May and the blacked-in triangle below the activity bar in June. The entire milestone was rescheduled four times and was completed at the time schedule by Revision 4, as indicated by the diamonds above the activity bar. Together with the MSSR, the Milestone Log should be reviewed. In the example, the planned and actual completion dates for milestone 1.1.1 and for activities A and B are shown in the Milestone Log, together with a comment regarding the approval for the schedule change.

FIGURE 11
MILESTONE SCHEDULE AND STATUS REPORT—DETAIL BY WBS

FIGURE 12
MILESTONE LOG

10-10-10-2 (2222)
 CONTRACT NO

IDENTIFICATION NO	DESCRIPTION	PLANNED COMPLETION DATE	ACTUAL COMPLETION DATE	COMMENTS
1.1.1.A	Demolition/Clearing	12/20/76	12/19/76	
1.1.1.B	Excavation	06/20/77	06/23/77	
1.1.1	Complete All Land Improvements	06/15/77	08/29/77	Schedule change approved per Revision 4
1.1.2.1.A	Hot Sump	02/19/77	01/31/77	
1.1.2.1.B	Linear and 1st Slab	03/15/77	06/30/77	
1.1.2.1.C	Comp Foundations	08/10/77	08/10/77	
1.1.2.1	Complete Foundation/Sub Structures	03/31/78		Schedule change approved
1.1.2.2.A	Complete Superstructures	03/20/78		
1.1.2.2.B	Complete Exterior S	08/30/78		
1.1.2.2				

- ④ An essential part of the MSSR analysis is to locate schedule deviations flagged by the contractor. These deviations are marked by diamonds as in the case of Task 1.1.2.1 and Task 1.3.1 of the example. Deviations must be checked for approval, and reasons for them should be found in the PSR. The Milestone Log of the example indicates, under "Comments," that the change in the schedule for Task 1.1.2.1 had been approved. When schedule variances have been identified, the impact of such variances on other milestones and/or projects should be ascertained prior to approving a change affecting the project schedule.

4. In evaluating the MSSR and its accompanying Milestone Log, questions such as the following need to be considered in addition to those enumerated previously:

- Does this report reflect the problems mentioned or alluded to in the PSR? Conversely, and more importantly, have all problems apparent in the MSSR been discussed in the PSR?
- For unapproved schedule deviations identified by diamonds, particularly variances which exceed established contract thresholds, have reasons been provided in the PSR?
- Is there any indication of schedule deviations in one milestone adversely affecting the schedule for other milestones?
- Have all intermediate events and critical milestones been identified in a Milestone Log? Does the Milestone Log identify approved changes to the schedule?
- Where a milestone has been rescheduled a number of times, is a history of such rescheduling provided by means of the proper symbols and numbers?
- Based on the PM's knowledge of the project, do the data appear creditable, e.g., Intermediate Events, Percent Complete, Planned Completion Date?
- To what extent are difficulties in meeting schedule milestones affecting cost and manpower, and are such difficulties reflected in the Cost Management Report and the Manpower Management Report?
- If this is an early report, does the contractor indicate that he will have problems meeting the schedule? Why? And what can be done before the problem becomes more difficult to resolve? In later reports, have milestones which were previously reported to be behind schedule fallen further behind? Have new milestones been added to the list of behind-schedule milestones? In other words, does an analysis of the trend indicate a worsening situation and if so what are the causes? Can they be reduced or eliminated and how? What is the outlook for overcoming the problem? A continuing unexplained behind-schedule situation warrants a more thorough analysis, possibly a request to the GTR and to the contractor's project manager for a study of, and a report on the situation. A visit to the contractor's facility or work site may provide more insight into the problem.

E. Manpower Management Report

1. When a Manpower Plan has been required (see II.B.2), a Manpower Management Report (MMR) may also be made a requirement. However, a Manpower Plan may be required as an aid in source evaluation without the concomitant requirement for Manpower Management Reports. As with the Manpower Plan, the PM should weigh the cost of the data against their value to the program management effort. When obtained, the report is used to provide information regarding the status against the baseline and to highlight project problems related to manpower. The report depicts the actual and planned application of manpower resources for the reporting period and cumulative to date, and the contractor's best estimates of manpower resources applicable to specified reporting elements and to the effort as a whole for the remainder of the fiscal year and for the balance of the effort. Because of internal manpower reporting practices, a contractor may find it difficult to assure exact correspondence between the manpower reported and the actual manpower

expended for a specified period. Minor differences that do not impair the validity of the Manpower Management Report as a planning, monitoring and controlling instrument may be considered acceptable by the PM. The contractor should be requested to make necessary corrections to the manpower expenditure data reported for previous periods by adjusting the reported expenditure data for the current period. For significant corrections, the PM should expect an explanation in the Project Status Report.

2. The Manpower Management Report may be by WBS (summary or detail) and/or by labor category, but the type used should be the same as that used for the Manpower Plan against which it is reviewed and analyzed. Examples of Manpower Management Reports by detailed WBS and by labor category are shown in Figure 13. The following comments are annotations to the WBS example:

- ① If actual manpower expenditures reported for the current period include adjustments to reflect corrections to the reported manpower expenditures for prior periods, such corrections should be discussed in the Project Status Report.
- ② The planned manpower expenditures for the current period should be those shown in the current Manpower Plan for the corresponding period.
- ③ The planned manpower expenditures to date are the sum of planned expenditures for prior fiscal years plus those planned for the current fiscal year to date as shown in the current Manpower Plan.
- ④ The estimated manpower expenditures are the contractor's current best estimates and may vary from the current Manpower Plan.
- ⑤ The base unit of measure must be the same as used in the corresponding Manpower Plan.
- ⑥ On the Detailed Manpower Management Report, a subtotal is provided for each summary element (in the example, the second-level work breakdown structure element). These subtotals make up the Summary Manpower Management Report when required.
- ⑦ The total manpower reported must be identical in all Manpower Management Reports submitted for the period, such as summary or detail WBS.

3. As in the case of all other plans and reports, the credibility of the data should be ascertained:

- Has all the identifying information (contract, contractor, dates, etc.) been shown correctly in the heading of the report?
- Has the required trailer information been provided and has the report been signed and dated?
- Is the arithmetic correct, e.g., additions of lines across, columns down?

Also, the report should be reviewed against the following plans and reports:

- The Manpower Plan, to determine the extent to which performance satisfies the plans as well as to determine whether manpower limitations have been observed (see Figure 14).
- The CMSR to ascertain that the total planned and actual manpower data are identical to those on that report.
- The Manpower Management Reports of previous periods—may be accomplished by plotting the data, comparable to the CMSR graphs.
- The Cost Management Report of the current report period, specifically the Cost Management Report by cost element, if required, in which labor cost is identified separately (see Figure 15).
- The Milestone Schedule and Status Report to ascertain that manpower application is consistent with the schedule.

FIGURE 13 **MANPOWER MANAGEMENT REPORT** **A. DETAIL BY WBS**

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(1/78)

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1. Contract Identification: Energetic Pilot Unit				2. Reporting Period 09/02/77 through 09/30/77				3. Contract Number 10-10-10-2 (2222)																																																																																																																																																																																																																																																																										
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Planned</th> </tr> <tr> <td>1.1.1</td> <td>Land & Improvements</td> <td>22</td> <td>15</td> <td>566</td> <td>565</td> <td>-</td> <td>-</td> <td>566</td> <td>565</td> <td>(1)</td> <td></td> </tr> <tr> <td>1.1.2.1</td> <td>Foundations & Substructures</td> <td>143</td> <td>163</td> <td>410</td> <td>392</td> <td>127</td> <td>631</td> <td>1168</td> <td>1150</td> <td>(18)</td> <td></td> </tr> <tr> <td>1.1.2.2</td> <td>Superstructure & Finishes</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>142</td> <td>1602</td> <td>2611</td> <td>2611</td> <td>-</td> <td></td> </tr> <tr> <td>1.1</td> <td>Subtotal Site & Buildings</td> <td>22</td> <td>178</td> <td>976</td> <td>957</td> <td>269</td> <td>2233</td> <td>4345</td> <td>4326</td> <td>(19)</td> <td></td> </tr> <tr> <td>1.2.1</td> <td>Sewage</td> <td>1</td> <td>1</td> <td>4</td> <td>4</td> <td>1</td> <td>8</td> <td>13</td> <td>13</td> <td>-</td> <td></td> </tr> <tr> <td>1.2.2</td> <td>Water</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>26</td> <td>28</td> <td>28</td> <td>-</td> <td></td> </tr> <tr> <td>1.2.3</td> <td>Electrical</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>10</td> <td>30</td> <td>30</td> <td>-</td> <td></td> </tr> <tr> <td>1.2.4</td> <td>HAC</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>27</td> <td>64</td> <td>64</td> <td>-</td> <td></td> </tr> <tr> <td>1.2</td> <td>Subtotal Utilities</td> <td>1</td> <td>1</td> <td>4</td> <td>4</td> <td>1</td> <td>71</td> <td>135</td> <td>135</td> <td>-</td> <td></td> </tr> <tr> <td>1.3.1</td> <td>Instruments and Control</td> <td>149</td> <td>145</td> <td>993</td> <td>896</td> <td>143</td> <td>1005</td> <td>2336</td> <td>2323</td> <td>(13)</td> <td></td> </tr> <tr> <td>1.3.2</td> <td>Fuel Equipment</td> <td>25</td> <td>25</td> <td>92</td> <td>92</td> <td>30</td> <td>275</td> <td>397</td> <td>397</td> <td>-</td> <td></td> </tr> <tr> <td>1.3.3</td> <td>Waste Handling</td> <td>71</td> <td>65</td> <td>375</td> <td>370</td> <td>90</td> <td>985</td> <td>2055</td> <td>2061</td> <td>6</td> <td></td> </tr> <tr> <td>1.3.4</td> <td>Fire Protection</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>127</td> <td>457</td> <td>457</td> <td>-</td> <td></td> </tr> <tr> <td>1.3</td> <td>Subtotal Equipment</td> <td>245</td> <td>235</td> <td>1460</td> <td>1358</td> <td>263</td> <td>2392</td> <td>5245</td> <td>5238</td> <td>(7)</td> <td></td> </tr> <tr> <td>1.4.1</td> <td>Test and Evaluation</td> <td>34</td> <td>31</td> <td>436</td> <td>412</td> <td>31</td> <td>360</td> <td>905</td> <td>900</td> <td>(5)</td> <td></td> </tr> <tr> <td>1.4.2</td> <td>Program Management</td> <td>19</td> <td>19</td> <td>291</td> <td>293</td> <td>25</td> <td>275</td> <td>881</td> <td>881</td> <td>-</td> <td></td> </tr> <tr> <td>1.4.3</td> <td>Data</td> <td>14</td> <td>14</td> <td>51</td> <td>49</td> <td>17</td> <td>295</td> <td>840</td> <td>843</td> <td>3</td> <td></td> </tr> <tr> <td>1.4.4</td> <td>Training</td> <td>4</td> <td>4</td> <td>15</td> <td>15</td> <td>4</td> <td>94</td> <td>120</td> <td>120</td> <td>-</td> <td></td> </tr> <tr> <td>1.4</td> <td>Subtotal Systems Integration</td> <td>71</td> <td>68</td> <td>793</td> <td>789</td> <td>77</td> <td>1024</td> <td>2746</td> <td>2744</td> <td>(2)</td> <td></td> </tr> <tr> <td>22</td> <td>Total</td> <td>482</td> <td>482</td> <td>3233</td> <td>3088</td> <td>610</td> <td>5720</td> <td>12471</td> <td>12443</td> <td>(28)</td> <td></td> </tr> </table>												15. 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Planned	1.1.1	Land & Improvements	22	15	566	565	-	-	566	565	(1)		1.1.2.1	Foundations & Substructures	143	163	410	392	127	631	1168	1150	(18)		1.1.2.2	Superstructure & Finishes	-	-	-	-	142	1602	2611	2611	-		1.1	Subtotal Site & Buildings	22	178	976	957	269	2233	4345	4326	(19)		1.2.1	Sewage	1	1	4	4	1	8	13	13	-		1.2.2	Water	-	-	-	-	-	26	28	28	-		1.2.3	Electrical	-	-	-	-	-	10	30	30	-		1.2.4	HAC	-	-	-	-	-	27	64	64	-		1.2	Subtotal Utilities	1	1	4	4	1	71	135	135	-		1.3.1	Instruments and Control	149	145	993	896	143	1005	2336	2323	(13)		1.3.2	Fuel Equipment	25	25	92	92	30	275	397	397	-		1.3.3	Waste Handling	71	65	375	370	90	985	2055	2061	6		1.3.4	Fire Protection	-	-	-	-	-	127	457	457	-		1.3	Subtotal Equipment	245	235	1460	1358	263	2392	5245	5238	(7)		1.4.1	Test and Evaluation	34	31	436	412	31	360	905	900	(5)		1.4.2	Program Management	19	19	291	293	25	275	881	881	-		1.4.3	Data	14	14	51	49	17	295	840	843	3		1.4.4	Training	4	4	15	15	4	94	120	120	-		1.4	Subtotal Systems Integration	71	68	793	789	77	1024	2746	2744	(2)		22	Total	482	482	3233	3088	610	5720	12471	12443	(28)	
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B. BY LABOR CATEGORY

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<table border="1"> <tr> <th rowspan="3">15. Identification Number</th> <th rowspan="3">16. Reporting Category (e.g., contract line item or work breakdown structure element)</th> <th colspan="2">17. Manpower Expended</th> <th colspan="2">Cumulative to Date</th> <th colspan="3">18. Estimated Manpower Expenditures</th> <th rowspan="3">19. Total Contract Manpower</th> <th rowspan="3">20. Variance</th> <th rowspan="3">21.</th> </tr> <tr> <th colspan="2">During Reporting Period</th> <th colspan="2"></th> <th rowspan="2">a. Subsequent Reporting Period</th> <th rowspan="2">b. Balance of Fiscal Year</th> <th rowspan="2">c. Total Contract</th> </tr> <tr> <th>a. Actual</th> <th>b. Planned</th> <th>c. Actual</th> <th>d. Planned</th> </tr> <tr> <td>1.0.A.1</td> <td>Senior Engineer</td> <td>140</td> <td>135</td> <td>808</td> <td>775</td> <td>127</td> <td>915</td> <td>2249</td> <td>2242</td> <td>(7)</td> <td></td> </tr> <tr> <td>1.0.A.2</td> <td>Engineer</td> <td>238</td> <td>237</td> <td>1606</td> <td>1522</td> <td>310</td> <td>2613</td> <td>5046</td> <td>5034</td> <td>(12)</td> <td></td> </tr> <tr> <td>1.0.A.3</td> <td>Laborer</td> <td>60</td> <td>65</td> <td>440</td> <td>420</td> <td>110</td> <td>1328</td> <td>2971</td> <td>2963</td> <td>(8)</td> <td></td> </tr> <tr> <td>1.0.A.4</td> <td>Craftsmen</td> <td>4</td> <td>4</td> <td>22</td> <td>22</td> <td>5</td> <td>111</td> <td>364</td> <td>354</td> <td>-</td> <td></td> </tr> <tr> <td>1.0.A.5</td> <td>Management & Administrator</td> <td>34</td> <td>35</td> <td>268</td> <td>260</td> <td>46</td> <td>621</td> <td>1504</td> <td>1503</td> <td>(1)</td> <td></td> </tr> <tr> <td>1.0.A.6</td> <td>Clerical</td> <td>6</td> <td>6</td> <td>89</td> <td>89</td> <td>12</td> <td>132</td> <td>347</td> <td>347</td> <td>-</td> <td></td> </tr> <tr> <td>22</td> <td>Total</td> <td>482</td> <td>482</td> <td>3233</td> <td>3088</td> <td>610</td> <td>5720</td> <td>12471</td> <td>12443</td> <td>(28)</td> <td></td> </tr> </table>												15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Manpower Expended		Cumulative to Date		18. Estimated Manpower Expenditures			19. Total Contract Manpower	20. Variance	21.	During Reporting Period				a. Subsequent Reporting Period	b. Balance of Fiscal Year	c. Total Contract	a. Actual	b. Planned	c. Actual	d. Planned	1.0.A.1	Senior Engineer	140	135	808	775	127	915	2249	2242	(7)		1.0.A.2	Engineer	238	237	1606	1522	310	2613	5046	5034	(12)		1.0.A.3	Laborer	60	65	440	420	110	1328	2971	2963	(8)		1.0.A.4	Craftsmen	4	4	22	22	5	111	364	354	-		1.0.A.5	Management & Administrator	34	35	268	260	46	621	1504	1503	(1)		1.0.A.6	Clerical	6	6	89	89	12	132	347	347	-		22	Total	482	482	3233	3088	610	5720	12471	12443	(28)	
15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Manpower Expended		Cumulative to Date		18. Estimated Manpower Expenditures			19. Total Contract Manpower	20. Variance	21.																																																																																																											
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1.0.A.5	Management & Administrator	34	35	268	260	46	621	1504	1503	(1)																																																																																																												
1.0.A.6	Clerical	6	6	89	89	12	132	347	347	-																																																																																																												
22	Total	482	482	3233	3088	610	5720	12471	12443	(28)																																																																																																												
23. Remarks BY LABOR CATEGORY										24. Manpower Expressed In HUNDREDS OF MANHOURS																																																																																																												
25. Signature of Contractor's Project Manager and Date C. M. Doo <i>C.M. Doo</i>						26. Signature of Government Technical Representative and Date M. A. Watcher <i>m.a. watcher</i>																																																																																																																

FIGURE 14 INTERRELATIONSHIP OF MANPOWER PLAN AND MANPOWER MANAGEMENT REPORT

MANPOWER PLAN – SUMMARY BY WBS

FORM DOE 534P
(1-78)

PAGE 1 OF 1

1. Contract Identification Energetic Pilot Unit										2. Contract Number 10-10-10-2 (2222)																			
3. Contractor (name, address) BKVS Inc. 3000 Construction Blvd. Anyplace, VA 22299										4. Contract Start Date 10/01/76																			
5. Contract Completion Date 06/01/80																													
6. Identification Number	7. Reporting Category (e.g., contract line item or work breakdown structure element)	8. Planned Prior Fiscal Year	9. Actual Prior Fiscal Year	10. Planned Current Fiscal Year												11. Planned Future Fiscal Years				12. Planned Subsequent Fiscal Year to Completion	13. Total Planned (Columns 8, 10, 11 and 12)								
				O	N	D	J	F	M	A	M	J	J	A	S	Total	a	b	c			d	e						
1.1	Site & Buildings	957	976	269	269	269	269	269	269	148	148	148	148	148	148	2502	79	6	80						4326				
1.2	Utilities	4	4	1	2	2	2	2	3	5	9	9	10	14	13	72	56	3							135				
1.3	Equipment	1358	1460	263	270	283	308	308	308	156	156	156	149	149	148	2655	1161	64							5238				
1.4	Sys. Integration	769	793	77	83	83	83	81	81	100	100	100	100	100	100	1088	744	143							2744				
Total				3088	3233	610	624	637	662	660	661	409	413	413	407	411	410	6317	2770	268					12443				
15. Remarks SUMMARY BY WBS										16. Manpower Expressed in HUNDREDS OF MANHOURS										17. Manpower Plan Date 07/28/77									
18. Signature of Contractor's Project Manager and Date C. M. Doo <i>C. M. Doo</i>										19. Signature of Government Technical Representative and Date M. A. Watcher <i>M. A. Watcher</i>																			

MANPOWER MANAGEMENT REPORT – SUMMARY BY WBS

FORM DOE 534M
(1-78)

PAGE 1 OF 1

1. Contract Identification Energetic Pilot Unit										2. Reporting Period 09/02/77 through 09/30/77										3. Contract Number 10-10-10-2 (2222)									
4. Contractor (name, address) BKVS Inc. 3000 Construction Blvd. Anyplace, VA 22299										5. Manpower Plan Date 10/01/76										6. Contract Start Date 10/01/76									
7. Contract Completion Date 06/01/80																													
14. Identification Number	15. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Manpower Expenditures				18. Estimated Manpower Expenditures				19. Total Estimated Manpower	20. Variance	21																	
		During Reporting Period		Cumulative to Date		a. Subsequent Reporting Period	b. Date of Fiscal Year	c. Total Cumulative																					
		a. Actual	b. Planned	c. Actual	d. Planned																								
1.1	Site & Buildings	22	178	976	957	269	2233	4345	4326	(19)																			
1.2	Utilities	1	1	4	4	1	71	135	135																				
1.3	Equipment	245	235	1460	1358	263	2392	5245	5238	(7)																			
1.4	Systems Integration	71	68	783	769	77	1024	2746	2744	(2)																			
Total		482	482	3233	3088	610	5720	12471	12443	(28)																			
23. Remarks SUMMARY BY WBS										24. Manpower Expressed in HUNDREDS OF MANHOURS																			
25. Signature of Contractor's Project Manager and Date C. M. Doo <i>C. M. Doo</i>										26. Signature of Government Technical Representative and Date M. A. Watcher <i>M. A. Watcher</i>																			

FIGURE 15
MANPOWER'S CONTRIBUTION TO COST

COST MANAGEMENT REPORT

COST ELEMENTS

15 IDENTIFICATION NUMBER	16 REPORTING CATEGORY (E G CONTRACT LINE ITEM OR WORK BREAKDOWN STRUCTURE ELEMENT)
	LABOR
	MATERIAL
	EQUIPMENT
	SUBCONTRACTS
	OTHER DIRECT COSTS
	TOTAL DIRECT COSTS
	OVERHEAD
	G&A
	TOTAL COSTS
	MANAGEMENT RESERVE . . TOT COST
	FEE
	TOTAL CONTRACT VALUE
86R	76 G
86R	76 5H
22	TOTAL

MANPOWER MANAGEMENT REPORT

LABOR CATEGORIES

15 IDENTIFICATION NUMBER	16 REPORTING CATEGORY (E G CONTRACT LINE ITEM OR WORK BREAKDOWN STRUCTURE ELEMENT)
10A1	SENIOR ENGINEER
10A2	ENGINEER
10A3	LABORER
10A4	CRAFTSMEN
10A5	MANAGEMENT & ADMINISTRATOR
10A6	CLERICAL
22	TOTAL

4. In addition to the above considerations, an evaluation of the Manpower Management Report should weigh the following questions:

- Are there significant variances between actual (Columns 17a and c) and planned (Columns 17b and d) manpower expenditures? Are such variances explained satisfactorily in the Project Status Report?
- When plotting actual vs. planned manpower expenditures, do successive points form a relatively smooth line (curvilinear) or are there large fluctuations? Have large fluctuations been explained in the Project Status Report?
- Does the graph indicate that actual manpower application follows the plan or is there a trend of larger-than-planned application of manpower, possibly forecasting a potential cost overrun?
- Do the planned manpower expenditures to date (column 17d) equal the sum of prior years planned manpower expenditures plus those planned for the current fiscal year to date as shown in the current Manpower Plan?

F. Cost Management Report

1. This is a periodic, usually monthly, report of the cost status of the contract/agreement as measured against the Cost Plan. It can be used to:

- Monitor and control the project with data on planned and actual costs for the current reporting period and cumulative to date.
- Forecast costs for subsequent reporting periods, the remainder of the fiscal year, and the life of the contract.
- Identify variances from the associated Cost Plan.
- Project short, intermediate, and long-range planning.
- Verify the reasonableness of contractors' invoices.
- Monitor costs and forecast fiscal year performance on DOE financial and program operating plans.

The report depicts accrued costs—actual and planned—for the reporting period and cumulative to date. It also shows the contractor's best estimates of costs applicable to specified reporting elements and to the effort as a whole for the remainder of the fiscal year and for the balance of the effort. Reporting elements against which actual and planned costs are reported in the Cost Management Report should be in agreement with the elements specified for the associated Cost Plan. These may be Work Breakdown Structure elements (summary or detail), construction elements (in connection with construction contracts), contract line items, or cost elements.

2. Examples of Cost Management Reports by WBS element and by cost element as shown in Figure 16. The following comments are annotations to the examples:

- ① The actual costs reported for the current period include any adjustments necessary to reflect corrections to reported costs for previous periods. The PM should expect the contractor to discuss major corrections in the associated Project Status Report.
- ② The planned costs for the current period are the costs shown in the current Cost Plan (indicated by date in Block 5).
- ③ The planned costs to date are the sum of planned costs for prior fiscal years plus the planned costs for the current fiscal year to date as shown in the current Cost Plan.

FIGURE 16 COST MANAGEMENT REPORT A. DETAILED BY WBS

FORM DOE 533M
(11/78)

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1 Contract Identification Energetic Pilot Unit				2 Reporting Period 09/02/77 through 09/30/77				3 Contract Number 10-10-10-2 (2222)															
4 Contractor (name and address) BKVS Inc. 3000 Construction Blvd Anyplace, VA 22298				5 Cost Plan Date 10/01/78				6 Contract Start Date 10/01/78															
								7 Contract Completion Date 06/01/80															
8 Government Funding 10,100		9 Contractor Funding -		10 Number of Invoices Billed 12		11 Frequency Monthly		12 Number of Invoices Paid 10		13 Total Invoice Amounts Billed 9426 Invoice No. (2222-12)		14 Total Payments Received 6625											
15 Identification Number												16 Reporting Category (e.g. contract line item or work breakdown structure element)		17 Accrued Costs		18 Estimated Accrued Costs		19 Total Contract Value		20 Variance		21 Unfilled Order Outstanding	
														a Actual b Planned c Actual d Planned		a Subsequent Reporting Period b Balance of Fiscal Year c Total Contract							
1.1.1												Land & Improvements		63 39 1501 1461		-		1501		1461		(40)	
1.1.2.1												Foundations & Substructures		452 489 1100 1016		302 1086		2498		2414		(84)	
1.1.2.2												Superstructure & Finishing		-		190 2476		4376		4374		48	
1.1												Subtotal Site & Building		615 608 2601 2477		601 3571		8325		8249		(76)	
1.2.1												Sewage		2 2 11 12		2 8		22		22		-	
1.2.2												Water		-		1 34		45		45		-	
1.2.3												Electrical		-		11 107		107		107		-	
1.2.4												H.A.C.		-		28 65		65		65		-	
1.2												Subtotal-Utilities		2 2 11 12		3 81		239		239		-	
1.3.1												Instruments & Controls		348 340 2689 2440		302 2218		6401		6347		(154)	
1.3.2												Fuel Equipment		38 40 209 208		37 410		656		670		14	
1.3.3												Waste Handling		133 142 876 868		200 1673		3840		3724		84	
1.3.4												Fire Protection		-		175 855		855		855		-	
1.3												Subtotal-Equipment		519 522 3873 3617		539 3713		10652		10600		(52)	
1.4.1												Test & Evaluation		78 76 688 649		48 1589		2700		2688		(12)	
1.4.2												Program Management		62 63 247 257		35 683		1884		1884		-	
1.4.3												Data		15 14 91 89		18 283		806		836		30	
1.4.4												Training		8 7 28 27		8 160		183		183		-	
1.4												Subtotal-Sys. Integration		183 190 1564 1522		107 2625		5583		5581		(2)	
1.0												Subtotal Contract Item G&A		1189 1192 8049 7828		1150 9980		24799		24465		(134)	
												G&A		184 183 1103 1045		158 1389		3387		3378		(9)	
												Management Reserve		-		-		1198		1198		-	
												FEE		41 41 274 260		39 341		846		877		31	
												TOTAL CONTRACT VALUE		1404 1396 8426 8933		1347 11700		29042		30119		1077	
B&R												76-G		562 558 3770 3573		539 4680		11617		12048		-	
B&R												76-SH		842 838 5656 5360		808 7020		17425		18071		-	
22 Remarks												24 Dollars Expressed in THOUSANDS											
25 Signature of Contractor's Project Manager and Date C. M. Doo				26 Signature of Contractor's Authorized Financial Representative and Date I. M. Counter				27 Signature of Government Technical Representative and Date M. A. Watcher															

B. BY COST ELEMENT

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(11/78)

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1 Contract Identification Energetic Pilot Unit				2 Reporting Period 09/02/77 through 09/30/77				3 Contract Number 10-10-10-2 (2222)																	
4 Contractor (name and address) BKVS Inc. 3000 Construction Blvd. Anyplace, VA 22298				5 Cost Plan Date 10/01/78				6 Contract Start Date 10/01/78																	
								7 Contract Completion Date 06/01/80																	
8 Government Funding 10,100		9 Contractor Funding -		10 Number of Invoices Billed 12		11 Frequency Monthly		12 Number of Invoices Paid 10		13 Total Invoice Amounts Billed 9426 Invoice No. (2222-12)		14 Total Payments Received 6625													
15 Identification Number												16 Reporting Category (e.g. contract line item or work breakdown structure element)		17 Accrued Costs		18 Estimated Accrued Costs		19 Total Contract Value		20 Variance		21 Unfilled Order Outstanding			
														a Actual b Planned c Actual d Planned		a Subsequent Reporting Period b Balance of Fiscal Year c Total Contract									
												Labor		372 358 2823 2774		380 3626		9237		9183		(54)			
												Material		37 41 199 199		9 115		340		329		(11)			
												Equipment		-		-		482		1115		1113		(2)	
												Subcontracts		468 487 2601 2276		436 2665		6190		6170		(20)			
												Other Direct Costs		4 1 26 21		2 20		65		64		(1)			
												TOTAL DIRECT COSTS		881 887 6649 6270		827 6908		16947		16859		(88)			
												Overhead		318 305 2400 2358		323 3082		7851		7806		(45)			
												G&A		184 163 1103 1045		158 1369		3397		3379		(18)			
												Management Reserve		-		-		1198		1198		-			
												TOTAL COSTS		1363 1355 9152 8673		1308 11359		28196		29242		1046			
												FEE		41 41 274 260		39 341		846		877		31			
												TOTAL CONTRACT VALUE		1404 1396 8426 8933		1347 11700		29042		30119		1077			
B&R												76-G		562 558 3770 3573		539 4680		11617		12048		-			
B&R												76-SH		842 838 5656 5360		808 7020		17425		18071		-			
22 Remarks												24 Dollars Expressed in THOUSANDS													
25 Signature of Contractor's Project Manager and Date C. M. Doo				26 Signature of Contractor's Authorized Financial Representative and Date I. M. Counter				27 Signature of Government Technical Representative and Date M. A. Watcher																	

- ④ The estimated accrued costs are the contractor's current best estimates, near term and contract total. These estimates will vary from costs shown in the current Cost Plan.
- ⑤ Unless otherwise specified, fee is shown as a separate line item.
- ⑥ The total costs assigned to each DOE Budget and Reporting (B&R) Number are shown on the bottom lines of this section. These are non-add figures. B&R Numbers and WBS/Task effort applicable to each are specified in the contract.
- ⑦ If cost sharing information is required, it may be shown beneath the Total Contract Value line, to indicate the share of each participating organization.
- ⑧ The cost variance is the difference between total planned costs (negotiated amounts) and the contractor's total estimated cost at completion of each reporting category element. Arithmetically, it is the difference between data in columns 18c and 19. The variance, if outside of contractually established thresholds should be explained in the Project Status Report. Unfavorable variances, indicated by parentheses, may provide an early sign of an impending overrun.
- ⑨ Unfilled orders outstanding comprise any outstanding commitments directly attributable to the contract, such as a purchase order, subcontract, or similar obligation to accept and pay for materials, services, etc., that have not been recorded as an actual cost.
- ⑩ The total contract value must be identical in all Cost Management Reports submitted.

3. The Cost Management Report cannot be analyzed in isolation. It must be reviewed against:

- The Cost Plan to determine the extent to which performance satisfies the plan, as well as to determine whether budgetary limitations have been observed. As may be seen from the example, Figure 17, the WBS in the first column of the Cost Management Report as well as the planned figures (Column 17d) and the total contract value data (Column 19) match the comparable data of the Cost Plan.
- The Cost Management Reports of previous periods. This may be accomplished by plotting the data for actual and planned cost similar to the cost status portion of the CMSR.
- The Manpower Management Report, specifically total manpower expenditures against the cost for "Labor" in the Cost Management Report by Cost Element.
- Milestone Schedule and Status Report to evaluate the contractor's ability to accomplish the remaining milestones with the remaining funds. If the plotting of cost data shows an unsatisfactory trend (e.g., the actual cost moving further and further ahead of planned) and milestones are not accomplished per schedule, the PM should expect the Project Status Report to provide an explanation of the problem and an indication of how it may be resolved. In the absence of a satisfactory explanation of a deteriorating situation, a meeting between DOE and the contractor's personnel may be warranted.

4. In evaluating the Cost Management Report, questions such as the following need to be considered in addition to those enumerated in previous paragraphs of this Handbook:

- Are there significant variances between actual and planned costs during the reporting period (Columns 17a and b) and cumulative to date (Columns 17c and d)? Are such variances explained satisfactorily in the Project Status Report?
- When plotting cumulative to date actual vs planned cost (Column 17c vs 17d), do the resulting curves show a smooth growth or are there large fluctuations? Have large fluctuations been explained in the Project Status Report?
- If Cost Management Reports are submitted by both WBS and cost element, are the totals identical? Is the arithmetic correct?

FIGURE 17
INTERRELATIONSHIP OF COST PLAN AND COST MANAGEMENT REPORT
COST PLAN – SUMMARY BY WBS

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(1-78)

PAGE 1 OF 1

1. Contract Identification Energetic Pilot Unit										2. Contract Number 10-10-10-2 (2222)												
3. Contractor (name and address) BKVS Inc. 3000 Construction Blvd. Anyplace, VA 22299										4. Contract Start Date 10/01/76												
										5. Contract Completion Date 06/01/80												
6. Identification Number	7. Reporting Category (e.g., contract line item or work breakdown structure element)	8. Planned Prior Fiscal Year	9. Actual Prior Fiscal Year	10. Planned Current Fiscal Year 1978												11. Planned Future Fiscal Years					12. Planned Subsequent Fiscal Years to Completion	13. Total Planned Cost (Columns 8, 10, 11, and 12)
				O	N	D	J	F	M	A	M	J	J	A	S	Total	*79	b 80	c	d	e	
1.1	Site and Buildings	2477	2601	473	491	491	491	491	491	210	208	207	209	207	207	4176	1196	400				8249
1.2	Utilities	12	11	2	2	2	2	2	3	6	8	9	14	16	17	83	117	27				239
1.3	Equipment	3617	3873	517	526	526	525	526	525	223	223	212	205	200	199	4407	2084	488				10596
1.4	Systems Integration	1522	1564	119	207	207	208	207	207	234	234	245	245	250	250	2613	1105	341				5581
	Subtotal	7628	8049	1111	1226	1226	1226	1226	1226	673	673	673	673	673	673	11279	4502	1256				24665
	General & Administrative	1045	1103	153	168	168	168	168	168	92	92	92	92	92	92	1545	617	172				3379
	Management Reserve																					1198
	TOTAL CONTRACT COST	8673	9152	1264	1394	1394	1394	1394	1394	765	765	765	765	765	765	12824	5119	1428				29242
	FEE	260	274	38	42	42	42	42	42	23	23	23	23	23	23	386	153	43				877
	TOTAL CONTRACT VALUE	8933	9426	1302	1436	1436	1436	1436	1436	788	788	788	788	788	788	13210	5272	1471				30119
B&R	76-4G	3573	3770	521	574	574	574	574	574	315	315	315	315	315	315	5281	2109	588				12048
B&R	76-5H	5360	5656	781	862	862	862	862	862	473	473	473	473	473	473	7929	3163	883				18071
	14. Total																					
15. Remarks SUMMARY BY WBS										16. Dollars Expressed In: THOUSANDS										17. Cost Plan Date 07/28/77		
18. Signature of Contractor's Project Manager and Date C. M. Doo <i>C. M. Doo</i>										19. Signature of Contractor's Authorized Financial Representative and Date I. M. Counter <i>I. M. Counter</i>										20. Signature of Government Technical Representative and Date M. A. Watcher <i>M. A. Watcher</i>		

COST MANAGEMENT REPORT – SUMMARY BY WBS

FORM DOE 533M
(1-78)

PAGE 1 OF 1

1. Contract Identification Energetic Pilot Unit										2. Reporting Period 09/02/77 through 09/30/77										3. Contract Number 10-10-10-2 (2222)														
4. Contractor (name and address) BKVS Inc. 3000 Construction Blvd. Anyplace, VA 22299										5. Cost Plan Date 10/01/76										6. Contract Start Date 10/01/76														
																				7. Contract Completion Date 06/01/80														
8. Government Funding 10,100	9. Contractor Funding	10. Number of Invoices Billed 12	11. Frequency Monthly	12. Number of Invoices Paid 10	13. Total Invoice Amounts Billed 9426 Invoice No. (2222-12)	14. Total Payments Received 6625	15. Identification Number				16. Reporting Category (e.g., contract line item or work breakdown structure element)				17. Accrued Costs				18. Estimated Accrued Costs				19. Total Contract Value				20. Variance				21. Unfilled Order Outstanding			
		During Reporting Period		Cumulative to Date		Subsequent Reporting Period		Balance of Fiscal Year		Total Contract																								
		a. Actual	b. Planned	c. Actual	d. Planned	e. Actual	f. Planned	g. Actual	h. Planned	i. Actual	j. Planned	k. Actual	l. Planned	m. Actual	n. Planned	o. Actual	p. Planned	q. Actual	r. Planned	s. Actual	t. Planned	u. Actual	v. Planned	w. Actual	x. Planned	y. Actual	z. Planned	aa. Actual	ab. Planned					
	1.1	Site and Buildings	515	508	2601	2477	501	3571	8325	8249	(76)																							
	1.2	Utilities	2	2	11	12	3	81	239	239	-																							
	1.3	Equipment	519	522	3873	3617	539	3713	10652	10596	(56)																							
	1.4	Systems	163	160	1564	1522	107	2625	5583	5581	(2)																							
		Subtotal	1199	1192	8049	7628	1150	9990	24799	24665	(134)	957																						
		General and Administrative	164	163	1103	1045	158	1369	3397	3379	(18)	131																						
		Management Reserve								1198																								
		TOTAL COST	1363	1355	9152	8673	1308	11359	28169	29242	1046	1088																						
		FEE	41	41	274	260	39	341	846	877	31	33																						
		TOTAL CONTRACT VALUE	1404	1396	9426	8933	1347	11700	29042	30119	1077	1121																						
	B&R	76-4G	562	558	3770	3573	539	4680	11617	12048																								
	B&R	76-5H	842	838	5656	5360	808	7020	17425	18071																								
		Total																																
23. Remarks SUMMARY BY WBS										24. Dollars Expressed In: THOUSANDS																								
25. Signature of Contractor's Project Manager and Date C. M. Doo <i>C. M. Doo</i>										26. Signature of Contractor's Authorized Financial Representative and Date I. M. Counter <i>I. M. Counter</i>										27. Signature of Government Technical Representative and Date M. A. Watcher														

- Are the total planned and actual cost data identical to those reported on the CMSR?
- Do the costs shown for "Labor" on the Cost Management Report by cost element relate reasonably to the planned and actual manpower data on the Manpower Management Report?
- Do the data for planned costs, current period and cumulative to date, track with the equivalent data in the current Cost Plan?
- Can the contractor's estimate of total cost at contract completion (Column 18c) be attained? This can be approximated by first deriving an estimated cost to complete the effort—by subtracting cost to date from estimate at completion (Column 18c minus Column 17c). This figure must then be evaluated against the schedule for the remaining effort as shown in the MSSR.
- The example used in this Handbook shows an estimate (Total Contract Value) of \$30,119,000 (Figure 16) to accomplish three full years of effort (Figure 11).
- Does a comparison between total invoices billed (Block 13) and total payment received (Block 14) indicate a lag which could impact the contractor's performance due to insufficient funds? In the example, Figure 16, approximately 70% of the total invoice amounts billed are reported as having been received by the contractor.
- Is the government funding (Block 8), after subtracting cumulative actuals (Column 17c), adequate to fund the effort for the remainder of the fiscal year (Columns 18a + b)?
- Do the unfilled orders outstanding (Column 21) appear to be an excessive government liability in case of contract termination?
- Are the burden costs (overhead and G&A) consistent with approved rates?
- Has the amount of management reserve been reduced from prior months in a manner which would indicate that the contractor needed to apply reserves to overcome actual or potential problem areas? A reduction of management reserve funds month after month may be indicative of a significant problem on the contract, particularly if applied to the same tasks or group of tasks.

5. Much of the analysis of the Cost Management Report and of the data from this plus related reports, may be accomplished by means of plotting the data on charts which would be brought up to date with every new report to quickly reveal trends, favorable or unfavorable, as well as deviations from trends. A number of such charts are suggested below:

a. *Percent Spent vs. Percent Complete*

The percent spent figures are derived by dividing actual cost, cumulative to date (Cost Management Report, Column 17c, total contract) by the total contract value (Column 19). The percent complete figure may be found in the MSSR, Column 10b. Comparison of the two figures permits an evaluation of performance to date as well as projection of future performance.

In the hypothetical example, Figure 18, the percent of work completed surpasses percent of funds spent at only one point. After that, the percent spent is persistently and increasingly greater than the percent complete, a trend which may portend serious problems unless corrective action is undertaken.

b. *Actual vs. Planned Cost*

The actual and planned cost data come from the Cost Management Report, Column 17c and 17d, respectively. These may be plotted against each other as in the CMSR (see III.C) and in the hypothetical example (Figure 19). The chart can be used to extrapolate the data to the planned date of contract completion.

However, care must be taken in drawing conclusions from these data because planned cost is a figure covering all of the effort which had been planned or scheduled. Normally, not all effort which had been scheduled is completed. Therefore, a comparison of the two lines in Figure 19 leaves something to be desired.

FIGURE 18
PERCENT SPENT VS PERCENT COMPLETE

FIGURE 19
ACTUAL VS PLANNED COST

The Cost and Schedule Control System, formerly Performance Measurement System, overcomes this problem by providing for data on Budgeted Cost of Work Performed (Earned Value) in addition to Budgeted Cost of Work Scheduled (see paragraph III.I).

c. *Contract Budget Base*

This chart, Figure 20, showing the total contract value or budgeted cost at completion (Column 19 of the Cost Management Report); would highlight changes in the budget base which take place during the life of the contract. Against this line, the contractor's estimated cost—total contract—(Column 18c of the Cost Management Report) can be plotted to indicate a potential cost overrun.

The hypothetical example indicates that the budget for the project has been increased through a number of contract changes. However, the contractor's estimate of cost at completion has increased even more, indicating the possibility of the project being inadequately funded.

d. *Cost and Schedule Variance*

The cost variance percentage figure is derived by dividing the variance reported in the Cost Management Report, Column 20, by the total contract value shown in Column 19. The schedule variance percentage figure is derived by subtracting actual percent complete from planned percent complete data in the MSSR Columns 10b and 10a respectively.

**FIGURE 20
CONTRACT BUDGET BASE**

This hypothetical chart, Figure 21, indicates the milestones are being accomplished close to schedule; in fact, during the last two reporting periods, ahead of schedule. This, however, seems to be accomplished at a cost, with the cost variance becoming more and more unfavorable.

**FIGURE 21
COST AND SCHEDULE VARIANCE**

G. Reports Integration

The UCRS provides for integration of schedule, manpower and cost data and, for each of these, a further integration of plan versus performance. Such integration improves the chances that all areas of impact are considered. Each report to be analyzed should be of like items. In the example, Figure 22, data for WBS element 1.1.2.1 "Foundations and Substructures" are shown for each Report—Schedule, Manpower and Cost—together with the Project Status Report explanation for the variance on this task. This example indicates that:

- The task is four weeks behind schedule.
- A cost/manpower overrun at completion of task is forecast.
- Current month activity is lower than planned.
- The schedule, with approved revision, will be met.
- MSSR shows 2% completion variance, a figure confirmed in the PSR..

The contractor has explained his plan for bringing the task back on schedule, but at a cost. Because the project has a management reserve (shown on Cost Management Report) this cost will be a part of the original contract value and no additional cost will be incurred by the Government. The important objective of an integrated review is to arrive at a correctly assessed status of the project. A consensus of several knowledgeable authorities is desirable, since it improves the chances of having all the areas of impact discussed. It also affords the opportunity to review and discuss various avenues for solving all problems, technical as well as funding and scheduling, and for structuring an effective recovery plan, if needed, for the total maintenance and control of the project.

**FIGURE 22
REPORTS INTEGRATION**

MANPOWER MANAGEMENT REPORT

MANPOWER →

		DURING REPORTING PERIOD		CUMULATIVE TO DATE		H SUBSEQUENT REPORTING PERIOD	H BALANCE OF FISCAL YEAR	F TOTAL CONTRACT	F TOTAL CONTRACT MANPOWER & VALUE	D VARIANCE	D UNFINISHED ORDERS ANDING
		A ACTUAL	P PLANNED	A ACTUAL	P PLANNED						
1121	FOUNDATIONS & SUBSTRUCTURES	141	163	410	392	127	631	1158	1110	1181	

COST MANAGEMENT REPORT

COST →

1121	FOUNDATIONS & SUBSTRUCTURES	412	419	1100	1116	377	1096	2698	2614	184	
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PROJECT STATUS REPORT

3 CONTRACT TASKS:

TASK 1 1—SITE BUILDING AS OF THE END OF THE REPORTING PERIOD, THIS TASK WAS SLIGHTLY BEHIND SCHEDULE AND EXPERIENCING A CUMULATIVE OVERRUN TO PLAN OF \$124,000. POOR WEATHER HAS BEEN A RECENT INSTRUMENTAL FACTOR FOR THIS SITUATION. HOWEVER, PREVIOUSLY REPORTED ENGINEERING PROBLEMS IN BOTH LAND IMPROVEMENTS (1 1 1) AND FOUNDATION AND SUBSTRUCTURE (1.1.2.1) HAVE BEEN THE MAJOR CONTRIBUTION TO THE CUMULATIVE COST OVERRUN. ADDITIONAL LABOR HAS BEEN PLANNED TO BRING THE ACTIVITY BACK ON SCHEDULE. ESTIMATE TO COMPLETE THIS ACTIVITY IS THAT ALL STRUCTURES WILL BE COMPLETED ON SCHEDULE WITH A FINAL OVERRUN TO PLAN OF \$76,000. LAND IMPROVEMENT WAS COMPLETED DURING THE MONTH. FOUNDATION AND SUBSTRUCTURES TASK IS CURRENTLY 2% BEHIND SCHEDULE.

H. Technical Evaluation

Evaluation of schedule, cost, and manpower status per se fails to provide an evaluation of the technical effort (no technical reports are required on construction contracts). To provide a means for such evaluation, the UCRS Guidelines call for four technical reports to be disseminated to the Technical Information Center (TIC) at Oak Ridge, Tennessee. These four reports are the Notice of Energy RD&D Project, Topical Report, Technical Progress Report, and the Final Technical Report. Draft copies of these reports are reviewed by the Project Manager, who also obtains any approvals required (i.e., patents) and who is responsible for ensuring that reports have been forwarded to the TIC.

Communications should exist among the Program Manager, Project Manager, GTR, Contracting Officer and the contractor, who should all contribute to the evaluation of the technical effort. UCRS performance reports may be structured to facilitate evaluation of project activities. However, they provide only limited information concerning the technical aspects of work efforts. Of the UCRS reports, only the Project Status Report enables the contractor to communicate current technical problem situations to the DOE PM, and to recommend corrective action. The evaluations of written reports should be supplemented by other techniques when appropriate, such as on-site visits and other personal contacts by telephone or in writing. This not only provides for a more in-depth look into the technical progress made towards achieving project objectives, but also provides an opportunity to review and discuss various avenues for solving technical problems and structuring an effective recovery plan, if needed, for the total maintenance and control of the project.

I. "Earned Value" Reports

1. In the UCRS Cost Management Report, the contractor reports actual cost and planned cost (budget) for both the report period and cumulative to date with estimated figures to the end of the contract. A comparison of these data is discussed in paragraph III.F.5b. As indicated, however, a third factor of major significance in project control is missing in this comparison. The factor is the progress achieved in relation to cost accrued. The Cost and Schedule Control System (CSCS), applied to high dollar value contracts within major DOE projects, requires data not only on Actual Cost of Work Performed (ACWP) and Budgeted Cost of Work Scheduled (BCWS), but also the Budgeted Cost of Work Performed (BCWP). The latter is also known as "Earned Value" and provides the above-mentioned third major factor in project control.

2. A comparison of BCWS and BCWP indicates whether more or less work was done than was scheduled to be done with the difference depicted as a Schedule Variance in terms of dollars. Comparing BCWP and ACWP indicates whether the work that was actually performed cost more or less (Cost Variance) than it was planned to cost. Analyses of Cost and Schedule Variances enable the contractors to identify problems, to determine reasons for deviations from plans, to take corrective actions, and to report the results.

Based on performance to date and estimates of future conditions, an Estimated Cost At Completion (EAC) is computed and compared to the total Budget At Completion (BAC). At the contract level, total budget is usually equal to the contract value; therefore, the difference (At Completion Variance) normally represents a forecast of contract overrun or underrun.

All the performance measurement data elements are available at the cost account or other selected level. This information can be used directly by the contractor's lower-level managers and summarized for higher levels of management and for reporting to DOE. The CSCS reporting system is structured so that data traceability is maintained and variances can be identified to their source.

3. A key to effective cost/schedule control is correlation of technical achievement with accomplishment of the work effort. In correlating cost, schedule and technical performance, it is apparent that unfavorable cost or schedule conditions are often caused by technical difficulties. When this is the case, the quantitative information in the cost and schedule reports should be supplemented by narrative to explain the technical problem and its impact.

4. The contractor analyzes performance measurement data for his own internal management needs and for preparation of the external reports. Contract data analysis is initiated at the performance measurement level by the appropriate manager. Cost, Schedule, and At Completion Variances that exceed established thresholds require review to determine cause(s), to evaluate options to

resolve the situation, and to report actions to higher level management. These internal data and their analysis are used by the contractor to:

- Report contract performance to Project Management.
- Communicate contract status among all levels of company management through a variety of reports (e.g., status by WBS, function, cost account, etc.) designed to serve individual manager needs.
- Provide input for formal contract status meetings.

To the DOE PM, the contractor-furnished performance reports present systematically summarized information in a manner designed to assist overall assessment of contract status. These reports require additional processing to facilitate their use and understanding, and to extract their full benefit. The use of various analytical techniques will assist the PM in:

- Determining the current cost and schedule performance status.
- Identifying trends in historical data.
- Forecasting, verifying, or questioning the future status.
- Highlighting areas requiring more detailed data.

The Performance Measurements System Data Analysis Guide (DOE/ET-0050/4; RDD/PMS-4, April 1978) describes a number of selected techniques for analyzing the data for most effective use in project management. Such techniques are contained specifically in Section IV, "Data and Information", Section VI, "Trend Analysis", Section VII, "Forecasting", and Attachment 3, "Guidelines for Variance Analysis". Project Managers with contracts to which CSCS has been applied and from which "Earned Value" reports are obtained should study the Data Analysis Guide and choose techniques described therein for application. However, a reading of neither this manual nor the Performance Measurement System Guides (RDD/PMS 1 thru 8) will adequately prepare either DOE or contractor personnel for the application of this system to contract performance evaluation. Where a project is of sufficiently high dollar value or national interest to warrant the application of CSCS, both DOE and contractor project management personnel should be required to attend training in detailed usage of the system. Such training is provided on a regular basis by the Department of Defense at its Defense Management College, Ft. Belvoir, Virginia.