Baseline Confidence Review
2006 Rocky Flats Closure Project Plan

The Department of Energy
Rocky Flats Field Office

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FINAL

ERNST & YOUNG LLP

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1. EXECUTIVE SUMMARY

The U.S. Department of Energy's Rocky Flats Field Office (RFFO) oversees the Rocky Flats Environmental Technology Site (RFETS), formerly the Rocky Flats Plant. The Rocky Flats Plant was originally part of the U. S. Department of Energy's (DOE) Nuclear Weapons Complex, but it is now being cleaned up under DOE's Environmental Management program. The primary mission now includes environmental restoration, waste management, and Special Nuclear Material (SNM) management. Since the Secretary of Energy's announcement that plutonium manufacturing and production contingency missions would cease, the new mission of RFETS is directed toward cleanup, deactivation, preparation for decontamination and disposition of facilities, and closure of the site.

DOE and RFFO selected Kaiser-Hill Company, LLC (Kaiser-Hill or K-H) to manage and integrate all activities required to close the Rocky Flats Plant. Kaiser-Hill previously developed several closure plans, including the recent 2010 Closure Project Baseline (CPB), referred to as the Rocky Flats Closure Plan (RFCP). On November 19, 1998, the RFFO Manager formally requested that Kaiser-Hill deliver, by May 21, 1999, a Baseline Plan for site closure in 2006.

RFFO engaged Ernst & Young LLP (Ernst & Young or E&Y) to determine, using standard practices, the reasonableness of the scope, cost and schedule projections delivered by Kaiser-Hill as part of the 2006 Rocky Flats Closure Project Baseline Plan issued to DOE on May 21, 1999. In addition, RFFO requested that Ernst & Young assess the potential for the successful implementation of the 2006 Rocky Flats Closure Project Baseline Plan. Ernst & Young has been assisted by two subcontractors in performing this assessment: Currie & Brown Inc. and Kellogg LLC. Field work for this assignment took place between June 1, 1999 and August 20, 1999.

The purpose of the assessment by the Ernst & Young team was to establish the following eleven points. Our overall conclusions for each of these points is also noted, with detail supporting our conclusions included in the appropriate sections of the report.

1. *Planning and assumptions are valid and current.*

   Most assumptions are valid and current. Exceptions are noted for each major assumption.

2. *The methodology for scope and organization of the work is generally sound.*

   Yes. However, since the organization of the work is generally by building or geographical area, certain major processes (Protected Area Closure, Waste Management, and others) will require additional DOE and Kaiser-Hill management focus.

3. *The work scope reflects the appropriate assumptions, technical bases and an understanding of the current conditions.*

   Generally yes. However, some of the assumptions for Waste Management and Environmental Restoration appear to be overly optimistic. If these optimistic assumptions are not valid, the closure date will not be met.

4. *The work logic and task sequencing effectively delivers the desired end state for the proposed schedule.*

   Generally, the work logic and task sequencing delivers the desired end state. However, we have made comments regarding higher level interfaces between major project components such as Waste Management and D & D. We have also commented on lower level schedule composition concerns that may affect sequencing and work logic, and therefore the critical path of the schedule.

5. *The total cost of the project is integrated with the schedule and appears to be reasonable.*

   Total cost is partially integrated with the schedule. Total cost appears to be reasonable; however, see item 8 below.

6. *The estimating methodology is generally sound and reflects the environment in which the project is being conducted.*

   Yes, the estimating methodology is generally sound, but it is not consistently applied.

7. *The bases of schedule and cost estimates are reasonable and at the appropriate level of detail.*

   The schedule basis is generally reasonable and at the appropriate level of detail. The cost basis is reasonable; however, the project will generate considerable cost data in FY 00 and FY 01 that should be captured in a revised cost estimate.

8. *The uncertainty of work has adequately been addressed and factored into the planning.*

   A schedule risk analysis has been performed but it requires major improvement. A cost risk analysis is not available. A contingency management program is not in place.

9. *Factors affecting schedule risks have been identified and are being managed.*

   See item 8.

10. *Factors affecting cost risks have been identified and are being managed.*

    See item 8.

11. *Resources (numbers and types) are identified and properly allocated.*

    Resources are identified and are being allocated. However, we have identified weaknesses in recruiting and in retention.

Based on our assessment, we have identified a number of issues and concerns that significantly reduce our confidence that the 2006 Closure Plan, as written, can achieve successful closure in 2006. We wish to recognize the tremendous effort by both Kaiser-Hill and RFFO to develop the 2006 Closure Plan, particularly in light of the large number of unknowns that exist for the closure of a site such as Rocky Flats. We also wish to state that we do not consider any of the issues and concerns listed below to be fatal to the efforts to close the site by 2006. Nevertheless, we believe that these concerns should be addressed quickly if the 2006 date is to be met.

Schedule

The following project schedule issues have significantly reduced our confidence in the ability of the 2006 CPB program to achieve closure in 2006:

1. Many of the most important cost and schedule assumptions in the 2006 CPB are centered on closure of the Protected Area (PA). PA closure is driven by two sequences of events, PuSPS and Shipment. We have concerns with these sequences; they contain manual constraints, lag relationships with positive lags and driving Level of Effort (LOE) activities and it appears that PA Closure activities are not tied to all potentially critical areas. If constraints and lags are removed, additional potentially critical logic ties added, and the driving path of the PuSPS revised from Level of Effort activities to detailed work-related activities the critical path, the project approach, and the PA Closure date may change when the schedule is recalculated.

2. It appears that many of the SNM Operations, Waste Management (WM) and Environmental Restoration (ER) LOE activities (including surveillance, maintenance, tech support and operations management) do not contain interface logic with the Building deactivation and decommission activities. For FY99, FY00 and even FY01 we believe that sufficient information is available to show the appropriate interdependency relationship between the support LOE activities and the appropriate deactivation and decommission activities. Without the appropriate interdependency relationships, the impact of a schedule delay in deactivation and decommission activities will not be identified by WM or ER.

3. The current process for WM and planning is accomplished through the Waste Generation, Inventory, and Shipping Forecast (WGISF) (see Appendix C) published by the Waste & Remediation Operations Group. This document is a compilation of waste forecasts produced by the Waste Generators, updated monthly, published on a quarterly basis, and provided to WM. The WGISF is the current WM planning and forecasting mechanism and is separate from the 2006 CPB Schedule. Because of this, the majority of the schedule activities within PBD 002 Waste Management Project have been incorporated as a Level of Effort and do not appear to reflect interface relationships between the waste generation areas and the appropriate waste management. The WGISF Process appears to be the best approach at this time for the out-years. However, for FY99 and FY00 there is sufficient information available from the Waste Generation groups for this WM information to be integrated into the 2006 CPB Schedule.

4. It is standard scheduling practice to allow schedule logic to drive the activity forecasts as opposed to imposing dates, events or activities in the schedule other than contractual commitments or milestones. Several important activities have manually constrained early start dates thereby forcing the forecast dates to the identified date and not allowing the predecessor activity logic to drive the sequence. This potentially means that the schedule is artificially manipulated as opposed to being calculated from the activity durations and assigned logic. The addition of unexplained or preferential constraints to the CPM Schedule may produce a biased critical path.

Site Operations

In the next two years, site operations will have the biggest impact on the path toward closure. However, several limiting factors affecting site operations are reducing our confidence in the 2006 Closure Plan. These include:

1. Resource Limits – Limited resources are evident throughout operations. In FY00 every operating project has estimated to increase their required resources. Management is expecting workers to be more efficient and work more overtime, yet workers have little incentive to do so. Given a strong national and local economy, untrained new hires are becoming more difficult to find. Further complicating the problem, new employees have a six-month to 12-month mobilization period for security clearance and training.

K-H has not established a structured, concise methodology or process for allocating or retaining human resources. If there is one, WAD managers appear to be unaware of it. As an example, we noted that WAD 21 intended to establish a two-shift operation for the resizing of plutonium materials. They have not been able to accommodate a two-shift operation due to limited resources.

2. PuSPS Functionality – Successful implementation of the PuSPS system is crucial to timely completion of the 2006 Plan. The K-H team's concerns about the Government Furnished Equipment (GFE) provided by British Nuclear Fuels Limited (BNFL) is well known. The nuclear packaging portion of the BNFL equipment was approved as GFE, the stabilization portion was not. K-H was contracted by DOE to design, fabricate, and construct new stabilization machinery. Additional testing performed at the request of K-H on the nuclear packaging system appears to have demonstrated that the system is less dependable than planned and would likely be prone to frequent breakdown requiring high maintenance.

K-H has proactively initiated design modifications that incorporate new methodologies to address potential contamination problems. We believe that K-H has taken appropriate and prudent action with respect to modifying or improving the PuSPS; however, in light of the acknowledged problems, the level of confidence in the system is very low.

Decontamination and Decommissioning

During our review of the decontamination, decommissioning, demolition, and disposal portions of the 2006 Closure Plan, we developed concerns about definitions and protocols for deactivation. While RFCA explicitly states what deactivation does not include, there does not appear to be a written protocol to diminish the "gray area" between deactivation and decommissioning within the PBDs or BOEs. This area will affect RFCP activities in the near future.

Deactivation is scheduled to be dove-tailed with other activities occuring in building clusters and is to occur simultaneously with NucOps, decommissioning and demolition. We concur with DOE that the facility disposition process should be broadened to provide guidance or direction

on deactivation. We noted that the characterization of deactivation activities is not consistently defined across the two PBDs that we reviewed.

Poorly defined processes may lead to Planning and Integration problems. For example, both building clusters contain highly contaminated areas (HCAs) where supplied breathing air (SBA) is required. Neither PBD nor the WADlets therein specifically address deactivation hold-up uncertainties and characterizations. We also noted that K-H identified no deactivation-specific assumptions. That is, their assumptions pertained to external factors that do not address risks associated with problem areas such as the HCAs.

Waste Management

Many of the key uncertainties associated with the execution of the WM component of the RFCP have been identified, however, a number of significant issues have not been adequately factored into the overall WM planning. The principal uncertainties related to the WM program include the timely availability of offsite waste disposal facilities, the uncertain volumes of wastes to be generated from the D&D and ER activities, and uncertainties related to the achievement of D&D and ER schedules.

A principal concern is that WM baseline schedule reflects only a LOE forecast and fails to capture the true profile of potential work to be performed. This is substantiated by the fact that K-H uses a separate management tool to forecast waste volumes (i.e., the monthly *Waste Generation, Inventory and Shipping Forecast*). To the extent that the LOE baseline schedule fails to reflect the WM work effort as presented in the *Waste Generation, Inventory and Shipping Forecast*, so too will the LOE baseline costs fail to reasonably reflect future costs.

Environmental Restoration

The PMP lists seven principal assumptions for ER. The findings for five of the seven assumptions indicate that the 2006 CPB is at risk because the assumptions are overly optimistic. Two of the assumptions appear to jeopardize the 2006 Closure Plan. The two most critical assumptions and our findings that reduce confidence in the 2006 Closure Plan are:

1. *ER soil action levels will conform to the final Action Levels for Radionuclides in Soils for the Rocky Flats Cleanup Agreement, October 18, 1996. (All soils with radioactivity less than Tier 2 levels, as defined in RFCA [Attachment 5] can be returned to the remediation site.)*

This assumption does not account for other cleanup levels that may result from the efforts of the Actinide Migration Evaluation Program, which may dictate additional scope related to soil removal and contaminant control activities in order to meet soil cleanup levels that are protective of downstream surface and groundwater quality.

2. *The appropriate regulators will approve the use of engineered caps as an integral part of the Site's closure strategy for landfills, for the Solar Ponds, and for areas within the Industrial Area, including the 700 Area.*

The final decision for closure caps for the landfills, solar ponds and Industrial Area may have cost and schedule risks that are not accounted for in the existing RFCP. The closure caps are assumed to be an evapo-transpiration (E-T) design. RFCA requires the caps to be RCRA-equivalent. The cognizant regulatory agencies have not yet accepted the E-T design as RCRA-equivalent. Planning and cost estimates assume that the overall cap structures will be similar to the cover tentatively approved by CDPHE for use at Rocky Mountain Arsenal. It is not clear that alternatives have been fully developed for alternate design of the caps if the E-T design is not approved for RFETS. Potential impacts could include increased cost of cap materials, increased time for design and approval, and impacts to cap construction implementation schedules.

Additionally, specific sources of soil for the closure caps have not been located or placed under contract or commitment. Although the RFCP indicates that soil will be obtained for closure caps from local sources within ten miles of the site, it is not clear that the availability of adequate volumes within that proximity has been evaluated. It is not clear that roadway access to the site, increased traffic volumes, and other transportation infrastructure issues related to the movement of large amounts of soil for the closure caps has been fully evaluated. These issues could create potentially significant schedule and cost impacts to the capping activities.

Resource and Management Plan Issues

Risk Management

K-H states in the Summary Risk Information (Section 2.2.1) that they 'calculate a 7% probability for Milestone 99 "Site Closure Complete" to occur by December 2006.' However, K-H also states that the frequency histogram '... illustrates the probability of Milestone 99 "Site Closure Complete" occurring during the period October 2006 and October 2007.'

To summarize, the probability of the project being completed by 2006 is very low but there is a 100% probability that the project will be complete by October 2007. We have serious reservation about the validity and reasonableness of the Schedule Risk Analysis results due to:

- The qualifications stated in the Schedule Risk Analysis concerning Additional Schedule Risk Issues and Elements of Schedule Risk.
- The apparent absence of consistent logic and constraints within the project schedule.
- The use of critical path and near critical path activities only in the quantitative analysis.
- Lack of apparent interdependency relationships within the quantitative analysis.

Uncertainty relates to the durations and resources associated with the "best estimate" or most probable activities. Risk relates to the less probable activities should they occur. Schedule uncertainty and schedule risk management should precede and feed into cost uncertainty and cost risk management.

Schedule uncertainty inherent in the most probable activities in the 2006 Closure Plan has been addressed but in a largely ad-hoc manner. Our review of the updated report issued August 30 does show improvement. However, we noted that little regard has been taken of the cost

uncertainty inherent in the most probable activities; a blanket cost contingency has been used instead.

No structured attempt has been made to reflect the consequences of the risks if less probable and generally less favorable activity streams may occur. In other words, K-H has not carried out adequate structured project risk and uncertainty management. This is evidenced by the lack of:

- Risk portfolios
- Risk management plans
- Calculated schedule and cost contingencies at the WAD level
- Contingency management program
- Earned value analysis

Funding Profile

It appears that K-H has only considered the two possibilities: the projected funding profile from the 2010 plan, and unconstrained funding. We recommend that they consider whether additional funding applied to areas such as Environmental Restoration planning and permitting would improve the likelihood of successful closure in 2006.

Critical Task Management

When the WBS was developed, a choice was made to break down most of the major tasks on a building by building basis. There were good reasons for this, and we are not recommending that the WBS be changed. However, a WBS that has been developed on a building or location basis makes it more difficult for a project to organize and manage processes that cut across many buildings or locations. For example, PA closure is a major process and achieving PA closure as scheduled is very important to success of the 2006 Closure Plan. However, because this process cuts across many PBDs, WADs, and buildings, it is more difficult to manage; and critical path schedule development for this process is weaker than if the WBS had been done on a major work process basis. WM and ER activities also cut across many PBDs, WADs, and locations.

It appears that K-H and DOE will be required to increase the management attention paid to major processes such as PA closure and WM, to overcome the bias of the WBS towards performing work by location.

Contingency Planning

The Project Management Plan (PMP) includes a section on Contingency Planning. However, during our document reviews and interviews, we did not see any evidence of a contingency planning process. The PMP includes contingency action tables for SNM and waste tasks, but the contingencies identified are relatively general, the resulting actions have not been developed in all cases, and the contingencies discussed only cover a small portion of the contingency planning that is necessary for the RFCP.

We recommend that a schedule and cost contingency management process be established. This process should include management and technical staff from both K-H and RFFO, and should meet and report on a regular basis. We believe that a rigorous contingency management process

is essential for success on this project due to the large number of unknowns and prototype operations.

We also note that the overall budget for the RFCP has a contingency identified, and that this contingency is carried at the project level. We agree that the contingency budget should be carried at the project level, but again we did not see any evidence that a process exists to manage the contingency budget. We recommend that this process be established, and that it include both DOE and K-H management. With the large number of uncertainties and contingent items in this project, it is essential that the contingency money be applied to the appropriate activities, and that the money be applied to activities that are on the critical or near-critical schedule path.

Performance-Based Incentives

Kaiser-Hill has performance-based incentives as part of their contract. We agree that performance-based incentives are a very good management tool, and we commend DOE for applying them to the RFCP. We did not perform a detailed review of incentives, but we did note two areas for improvement.

The incentives are developed on an annual basis, based on fiscal years. This creates the danger that short-term incentives will either create future problems as short-term items are completed in a way that increases future difficulties, or will postpone difficult tasks into later years so that easier milestones can be achieved in the short term. For example, a short-term demolition milestone might be achieved at the cost of an unreasonable increase in LLMW volumes. We also noted that there were no incentives for such things as staff retention, even though resources are critical to success of the RFCP.

We recommend that the incentives be reviewed and developed on an overall RFCP basis, then developed and implemented in more detail on a fiscal year basis. The incentives can then be structured in a way that mitigates the risks of too much focus on short-term incentives. We also recommend that a portion of the incentives be focused on resource development and retention and on increased resource productivity. We have identified the potential lack of human resources as one of the highest risks to success, therefore we recommend that the management contractor be given incentives to improve this situation.

2. SCOPE OF WORK AND APPROACH

2.1 Scope of Work

The U.S. Department of Energy's Rocky Flats Field Office (RFFO) oversees the Rocky Flats Environmental Technology Site (RFETS), formerly the Rocky Flats Plant. The Rocky Flats Plant was originally part of the U.S. Department of Energy's (DOE) Nuclear Weapons Complex, but it is now being cleaned up under DOE's Environmental Management program. The site was built in the early 1950's. Subsequent additions have increased the original capacity to approximately 3,000,000 square feet of floor space in more than 135 structures. Most of the buildings used in the past for production are over 30 years old, and have unknown amounts of contamination

The primary mission now includes environmental restoration, waste management, and Special Nuclear Material (SNM) management. Since the Secretary of Energy's announcement that plutonium manufacturing and production contingency missions would cease, the new mission of RFETS is directed toward cleanup, deactivation, preparation for decontamination and disposition of facilities, and closure of the site. The new mission must be accomplished in a way that maintains the site in a safe condition for workers, the public, and the environment and in compliance with applicable laws, regulations and agreements.

DOE and RFFO selected Kaiser-Hill Company, LLC (K-H or K-H) to manage and integrate all activities required to close the Rocky Flats plant. K-H previously developed several closure plans, including the recent 2010 Closure Project Baseline (CPB), referred to as the Rocky Flats Closure Plan (RFCP). During June 1998, the Secretary of Energy and the RFFO Manager completed the 2006 Rocky Flats Closure Project Management Plan. On November 19, 1998, the RFFO Manager formally requested that K-H deliver, by May 21, 1999, a Baseline Plan for closure of the Site in 2006. At a minimum, K-H was directed that the Rocky Flats Closure Project Baseline Plan would include:

1. Closure Project Management Plan similar to the one developed for the 2010 Closure project, including a through and credible Programmatic Risk.
2. Project Baseline Descriptions (PBDs) defining life cycle work scopes, schedules, milestones and strategies.
3. Cost Profile Summary Reports at the PBD and work Authorization Document (WAD) level over the life cycle of the 2006 Closure Project.
4. The Closure Project Completion metrics for the 2006 Plan.
5. The Milestone Sequence Chart depicting revised milestone dates.
6. The internal Milestone Listing by PBD and WAD in support of the milestones in (5) above
7. The Critical Closure Path schedule along with the revised Expanded Management Summary Schedule supporting Critical Path.

RFFO engaged Ernst & Young LLP (Ernst & Young or E&Y) to determine, using standard practices, the reasonableness of the scope, cost and schedule projections delivered by K-H as part of the 2006 Rocky Flats Closure Project Baseline Plan. In addition, RFFO requested that Ernst & Young assess the potential for the successful implementation of the 2006 Rocky Flats Closure Project Baseline Plan. Ernst & Young has been assisted by two subcontractors in performing this assessment: Currie & Brown Inc. and Kellogg LLC.

The purpose of the assessment is to establish the following:

1. Planning and assumptions are valid and current.
2. The methodology for scope and organization of the work is generally sound.
3. The work scope reflects the appropriate assumptions, technical bases and an understanding of the current conditions.
4. The work logic and task sequencing effectively delivers the desired end state for the proposed schedule.
5. The total cost of the project is integrated with the schedule and appears to be reasonable.
6. The estimating methodology is generally sound and reflects the environment in which the project is being conducted.
7. The bases of schedule and cost estimates are reasonable and at the appropriate level of detail.
8. The uncertainty of work has adequately been addressed and factored into the planning.
9. Factors affecting schedule risks have been identified and are being managed.
10. Factors affecting cost risks have been identified and are being managed.
11. Resources (numbers and types) are identified and properly allocated.

2.2 Approach to the Work

The following table lists the technical requirements from the Department of Energy/Rocky Flats Field Office (DOE/RFFO) for the baseline confidence review of the 2006 Rocky Flats Closure Project Plan. We reviewed the 2006 Closure Plan from several perspectives; therefore, the responses to many of the technical requirements are found in more than one section of our report. This table maps the Ernst & Young report sections to the DOE/RFFO technical requirements.

DOE Technical Requirements from RFP	Ernst & Young Report Sections
Planning assumptions are valid and current	4.1
Methodology for scope and organization of work is generally sound	4.2 4.3
Work scope reflects appropriate assumptions, technical bases and an understanding of current conditions	4.1 – 4.7
Work logic and task sequencing effectively deliver the desired end state for the proposed schedule	4.2.2 4.4
Total cost of project is integrated with the schedule and appears to be reasonable	3 4.4
Estimating methodology is generally sound and reflects the environment in which the project is being conducted	4.5.1 4.5.2
Bases of schedule and cost estimates are reasonable and at the appropriate level of detail	4.4 – 4.7
Uncertainty of the work has adequately been addressed and factored into the planning	4.3 – 4.4 4.6 – 4.7
Factors affecting schedule risks have been identified and are being managed	4.4 4.4.7
Factors affecting cost risks have been identified and are being managed (including cost risks that result from schedule risks)	4.5 4.6 4.7
Resources (numbers and types) are identified and properly allocated	4.2

The number and diversity of the tasks required to close the Rocky Flats site caused the review team to develop several approaches to assessing the major parts of the Closure Plan. The following section describes the methods used for the major components of the 2006 Closure Plan.

Schedule

Ernst & Young interviewed various members of K-H's staff to better understand the methodology applied to develop the 2006 Closure Plan Baseline (CPB) Schedule. Understanding

how the contractor developed the schedule enabled us to focus our review of the 2006 CPB Schedule and allowed us to deliver more substantive feedback.

The 2006 CPB Schedule is the culmination of three previous closure schedules. When K-H was awarded the contract in 1995, they developed a high level, "top down" type of schedule called the Accelerated Site Action Plan (ASAP) which incorporated approximately 1,600 schedule activities; this cumulative schedule represented a baseline of the overall scope of work to achieve site closure by 2010. The next schedule developed was the Life Cycle Baseline (LCB) schedule. This schedule included approximately 17,000 activities and provided a greater level of detail for the scope of work to achieve site closure. This schedule was resource-loaded and provided K-H with the necessary information to project staffing and personnel requirements as well as funding needs.

The LCB was then used by K-H and the four primary contractors on site (often referred to as the "Four Tops") to develop the 2010 Closure Plan Baseline (CPB) Schedule. The 2010 CPB Schedule that was developed in Primavera Project Planner (P3) had approximately 27,000 activities when it was first published. In this schedule, K-H attempted to fully integrate all of the ongoing Special Nuclear Material operation programs with the activities required to achieve site closure. The organizational structure elements of the 2010 CPB Schedule are the Project Baseline Descriptions (PBDs), which are broken down into Work Authorization Documents (WADs), containing WADlets or Work Breakdown Structures (WBSs). The WADs and WADlets represent the individual projects that must be executed to achieve site closure and contain the individual activities that the contractor(s) will perform on a daily basis.

This 2010 CPB Schedule was a detailed "bottom-up" type schedule that was developed at the WAD and WADlet levels and rolled up to a summary level scope of work as documented in the PBDs. The work activities were given durations by using a template of "quantity of work"-based assumptions developed by K-H. Each quantity-based assumption was reviewed by a Subject Matter Expert (SME) for its appropriateness for each individual room or work area and subsequently the activity durations were modified to reflect the input of the SME.

As each WADlet and WAD was developed through the process noted above, the resources were entered into K-H estimating program Basis of Estimate Tool (BEST), which is part of K-H's project management software called Joshua. BEST then used this information to develop a cost of the work for each activity within each WAD or WADlet. K-H indicated, as part of their fully integrated schedule, that every schedule activity has a corresponding item in the BEST program. These costs and resources were then downloaded back into the 2010 CPB Schedule. Concurrent with the loading of resources into BEST, the resource information was used to calculate the activity durations independent of BEST and P3. P3 then spreads the costs and resources over the scheduled activities. However, P3 was not used to manage non-skilled resources, only to manage resources for Critical Skill Analysis, (i.e., the hiring and training of personnel with SNM skills, and to provide a forecast over a period of time). This cost and resource flow information is then downloaded back into the Joshua project management system and into a program called PIRS (Planning and Integration Reporting System).

The procedures listed above are still in use and were used in developing the 2006 CPB Schedule. The 2006 CPB Schedule is a revision to the 2010 CPB Schedule that has been accelerated to achieve site closure by 2006. K-H has stated that the bulk of accelerated activities are focused in the Decontamination and Decommissioning areas. Additionally, the organizational structure of the 2006 CPB Schedule remains largely unchanged from the 2010 CPB, and K-H has begun to apply the "Rolling Wave" development methodology in accordance with K-H's Standard 10 – Scheduling. K-H's Rolling Wave methodology requires that the current fiscal year and the next fiscal year be the most developed in detail and that the out years may reflect a lower level of detail.

In addition to the P3 2006 CPB Schedule the following schedules also exist and are used for different purposes:

Schedule Document	Use
2006 Management Summary Schedule (MSS) – Revision 2.0	Presentation Tool
2006 Expanded Management Summary Schedule (EMSS) – Revision 2.0	Communication, integration, and Quality control/validation Tool
2006 Critical Path	Presentation Tool
Milestone Sequence Chart Revision 2.0	Presentation Tool
Rev. 7 (1/26/99) Baseline Resource Leveled/Unconstrained Funding/Planning In The Year Prior To Decommissioning/ Associated ER Activities Incorporated chart ("Eye-chart")	Basis for Facility Disposition Cost Model

The above schedules are manually extracted from the P3 2006 CPB Schedule and should conform to the configuration controlled CPB except when displaying leading information to guide CPB development to be in accordance with the K-H's Standard. In some cases the basis for the forecasts shown in these schedules can not be found in the P3 2006 CPB Schedule or the forecasts do not match the P3 version. Specific inconsistencies are outlined in Section 4.4. of this report.

The comments, concerns and recommendations found in Section 4.4 of this report are the result of Ernst & Young's review of those portions of the 2006 Closure Project Baseline (CPB) Schedule we felt were critical to site closure as scheduled in 2006. We did not review all 2006 CPB Schedule assumptions, scope and sequence; we reviewed a representative set of the Work Authorization Documents (WADs) within several critical Project Baseline Descriptions (PBDs).

The Project documentation reviewed included:

- Electronic copy of 2006 Closure Plan Baseline (CPB) Schedule (2K62)
- Electronic copy of 2010 CPB Schedule (CPBT)
- K-H Rocky Flats Closure Project Management Plan (PMP)
- Interviews with the associated K-H Planning & Integration staff
- Various PBD specific scheduling work papers (i.e., sequencing plans, drawings and duration calculations)

After reviewing the PMP and the "2006 Critical Path" bar chart, we elected to review the Special Nuclear Material (SNM) operations, five building clusters inside the PA which account for approximately 68 percent of the D&D scope, Waste Management (PBD 002) and Environmental Restoration (PBD 001 and 013). The building clusters inside the PA which we reviewed include 371, 779, 771/774, 776/777 & 707/750. The Environmental Restoration review focused on PBD 001 and 013 and included PBD 014, WAD 25 Industrial Zone Closure Project since the majority of the environmental restoration cost as well as activities of high schedule criticality are within these areas.

Rocky Flats Cleanup Agreement (RFCA) Compliance

The overall intent of the RFCA is to facilitate and enhance the ability of a selected sitewide cleanup strategy to effectively meet the end-state criteria set for the Site. In doing so, RFCA specifically leaves the development and implementation of detailed activity, schedule and cost elements to the cleanup plan itself. In short, RFCA is intended to be an enabling mechanism for the RFCP.

Key to the overall success of RFCA in enabling the accelerated closure of RFETS is the incorporation of key features of RFCA into the overall management and direction of the RFCP. The principal aspects of RFCA reviewed for purposes of this evaluation include the following:

- The streamlined regulatory framework imposed at RFETS by RFCA.
- The regulatory milestones and target activities specifically designated in RFCA.
- RFCA's No Action/No Further Action protocol.
- RFCA's Dispute Resolution process outlined by RFCA.

Each of these aspects and their impact to the RFCP are discussed in Section 4.2.3.

Site Operations

To validate the effectiveness of Site Operations, we identified and analyzed specific work activities that we deemed indicative of the highest risk, cost, or "integration" exposure. This approach required a focused and thorough scrutiny of specific WADlets and the schedule and estimating bases that support them. We reviewed a representative number of specifically identified PBDs, WADs, and WADlets within the operations project. A detailed assessment of the WADlets was required to test the management processes because estimating, scheduling and integration assumptions and support reside only within the WADlets. The WADlets provide the most meaningful insight to project protocol and controls.

Our baseline confidence review of operating activities targeted those PBDs, WADs, and WADlets that directly affect the critical path to closure. The level of risk criticality was assessed based on the level of risk or uncertainty that we subjectively assigned to each activity. The risk assessment is comprised of three basic components: cost, schedule, and technical difficulty. Aside from risk and uncertainty, our sample selection was driven by process. The PBDs, WADs,

and WADlets that we have selected all "crosscut" one another at different points throughout the project lifecycle, thus allowing us to critique the integration of operating activities within the 2006 baseline. This approach also permits us to analyze methodology and the potential alteration of the critical path to closure due to risk and uncertainty in each operating activity.

By researching risk, process methodology, implementation and integration from a WADlet level, we were better able to analyze the logical composition of the 2006 CPB. While Facility Landlord Functions comprise a significant contribution to project cost and are an important component of mortgage milestone reductions, they were given lower risk priority. Nuclear Operations ("NucOps") on the other hand represent the essence of the RFCP and for that reason we applied a higher level of scrutiny in this area. Furthermore, NucOps exemplify all three components of risk and have a major bearing on the Project's closure critical path currently scheduled for 2006.

In consideration of the above, we selected the following PBD's:

PBD	Description
8	Plutonium Metals & Oxide Stabilization
9	Plutonium Solid Residue Stabilization
12	SNM Shipping
16	Closure Cluster 371
17	Closure Cluster 707/750
18	Closure Cluster 771/774

It should be noted that selection of these PBDs does not suggest that the others are of less importance; the selection was intended to be indicative of the "cross cutting" operational functionality across the project. A complete list of the PBDs, WADs, and WADlets selected for our sample follows in Section 4.5.1.

Each PBD was subject to a high-level review to determine which WAD within the PBD would be selected for analysis. Then we focused on WADs that represented the highest cost and most significant technical and schedule risk. The same essential selection criteria were applied to the selection of WADlets. Upon review of a broad pool of WADlets, we selected a sample that we believed would best demonstrate the following:

- Integration and crosscutting functionality. WADlets which most depended upon coordinated management across activities were selected;
- Management protocol and accountability. WADlets that were assigned the same manager were generally not reviewed. The reason for this was to test the application of policy and procedures. This is based upon the assumption that strong policy and procedures would be proved through implementation consistency across different projects.

After selecting PBDs, WADs, and WADlets for review, we gathered support data pertaining to them which was available through the RFETS intranet network. These documents include the following:

- Project Baseline Descriptions ("PBDs") including Appendix A - Baseline Cost Detail, Appendix B - Change Control Logs, and Appendix C - Work Authorization Documents (by fiscal year)
- Basis of Estimates ("BOEs")
- Selected WAD Level Project Performance Reporting ("PPR")
- Selected P&I Reporting – Cost Performance Reports ("CPR")
- Selected WAD Spending Variance Reports ("SVR")
- Primavera Project Planner ("P3") scheduling data
- Joshua, BEST, P&I Reporting database.

Upon completion of the preliminary document review, we arranged interviews with key personnel from both the K-H project management team and the Department of Energy. Among other things, the interviews were conducted to confirm the assumptions identified in the PBDs, allow explanation of project management reasoning, discover client perceptions of services delivered and to clarify project controls and protocol.

We made guided tours of Buildings 707, 776/777, and 371. The purpose of the tours was to become familiar with the physical plant operations and to better appreciate constraints and encumbrances that are identified in the Bases of Estimate. Building 707 and Building 371 were selected based upon their relative status of completion in the closure work program. From an operations standpoint, these buildings were selected because they will provide the majority of nuclear material processing throughout the project lifecycle. Furthermore, Building 371 will house the PuSPS and is on the critical path for closure by 2006.

After all support documents were reviewed and interviews and inspections were completed, we compared K-H Project Management assumptions and planning to our fact-based findings and the perceptions of the KH Project Team. We also used "Joshua," a proprietary K-H software package for budgeting and tracking costs, and the P3 reporting tools to analyze how cash flows and resources correlated to key milestones.

Decontamination and Decommissioning

The following discussion is the result of our review of the 2006 Closure Project Baseline for the D&D scope of work. The intent of this confidence review is to validate the basic methodologies that K-H employed to establish the schedule and cost integral to the PMP. The scale and complexity of the RFCP is such that a thorough examination of all D&D is neither feasible nor, given the intent, appropriate.

It is not intended to be a comprehensive review of all PBDs associated with D&D; instead, it is a representative review of specifically identified buildings which are either highly contaminated or otherwise indicative of K-H's methodology

Accordingly, we selected a number of buildings that we deemed "critical" or otherwise indicative of K-H's methodology for review as will be discussed further below.

The preponderance of D&D scope and estimated cost resides within selected Type III building clusters as follows:

1. Building 371;
2. Building 707;
3. Building 771;
4. Buildings 776/777; and,
5. Building 779.

Of these five, K-H selected the last three building clusters (771, 776/777 and 779) to perform a bottoms up estimate. K-H also selected building clusters 444 and 886 for bottoms up estimating. The latter two were selected because they are critical to the timely closure of the site due to their relationship with other operations.

In order to assess the completeness of scope, accuracy, methodology and consistency of estimating in general, we reviewed both the bottoms up and top down processes. For bottoms up estimating, we reviewed, in some detail, four of the five estimates that were prepared. We did not review the estimate for Building Cluster 886.

The "top-down" estimate produced from FDCM was analyzed by reviewing, verifying and challenging historical data and estimating assumptions that K-H incorporated in the model. Finally, the BEST system was tested to insure all completed "bottoms-up" and "top-down" estimates are accounted for and presented accurately.

Waste Management

The Waste Management Project (WMP) was evaluated by a detailed review of the electronic copy of the 2006 Closure Plan documents (Revision 2, dated May 21, 1999) which included the:

- 2006 Closure Project Baseline (CPB)
- Project Management Plan (PMP)
- Project Baseline Descriptions (PBDs)
- Cost Estimate Report (CER)
- Summary Schedule Booklet, and Risk Assessment Plans (RAP)

We also conducted interviews with personnel at the Department of Energy/Rocky Flats Field Office (DOE/RFFO) and K-H who are directly responsible for the activities associated with the WMP.

The WMP, Project Baseline Description 002, is essentially a site closure support function. WMP provides specific services to other site activities, most importantly, Decontamination and Decommissioning of site facilities and Environmental Restoration clean-up activities. WMP activities typically include storage, treatment (if necessary), packaging, staging and ultimate shipment of the following types of waste:

Low Level Waste (LLW) Process
Low Level Waste (LLW) Remediation
Low Level Mixed Waste (LLMW) Process
Low Level Mixed Waste (LLMW) Remediation
Transuranic Waste (TRU)
Transuranic Mixed Waste (TRM)
Hazardous Waste
Sanitary Solid Waste
Sanitary Liquid Waste
Uncontaminated Debris

These wastes do not include material that is excavated from a remediation, either D&D waste or ER waste treated to specific action levels, that is subsequently replaced or used as fill elsewhere. Only those wastes that require further management (e.g., treatment or off-site disposal) are included in the above.

Environmental Restoration

Figure 5-3 of the PMP identifies three PBDs under the title "Environmental Restoration" (ER):

- PBD-001, Buffer Zone Closure
- PBD-013, Closure Caps
- PBD-027, Analytical Services.

In addition, the functional role of ER crosscuts many important closure projects. Accordingly, there are significant ER activities in many other PBDs. In fact, K-H tracks ER activities in 21 WADs and 13 PBDs.

For the validation studies, certain ER elements were selected for review to represent the full diversity of the important ER closure activities. In general, attention was focused on the high-cost WBS elements. However, other important factors were also considered, including:

- type of ER activity (planning/characterization, construction, monitoring/evaluation)
- location of the activity (industrial zone, buffer zone)
- cost/schedule type ("Level of Effort (LOE)" or "non-LOE")
- time frame for the work ("early" or "late" in the baseline schedule).

These selection considerations are illustrated in the *WBS Selection Matrix* for the WBS elements reviewed; this matrix is included in Section 4.7.1.

The general approach was to review the selected WBS elements (WADlets) to gain a detailed understanding of important ER activities and to obtain confidence in the processes and level of detail employed in developing the ER closure plan activities. The detailed review of individual WBS elements included a review of scope, schedule, costs and risks, in accordance with the technical requirements of the engagement:

Scope — The narrative scope of work for each WBS was evaluated against the Technical Strategy and Fiscal Year Baseline Statement of Work presented in the relevant Project Baseline Descriptions. The primary purpose was to assess, in a qualitative sense, the degree to which the stated scope of work was considered within the technical approach, the relative detail to which scope activities have been identified, and early FY allocation of scope. This evaluation also provides a qualitative assessment of the relative degree to which the anticipated scope of work for a given WBS has been defined, organized and, at least conceptually, planned. This also provides an indication of the extent to which narrative scope definitions match the schedule and cost elements of the WBS, the manner in which the technical strategies are reflected in schedule logic, and the overall scaling of major scope items against broad FY costs.

Schedule – The WBS schedule was reviewed from an overview perspective to assess integration with the WBS work scope descriptions, fiscal statements of work, and BOE cost profiles. Where appropriate, the WBS schedule review provides a qualitative indication of overall schedule content and logic with respect to activities and sequencing issues identified in the WBS Technical Approach and FY Baseline Statement of Work. Gross disparities between the various narrative portions of the WBS scope and the WBS schedule are general indications of potential changes or uncertainties in scope or timing of activities, or potential coordination issues between management, planning and/or operational functions responsible for the WBS. This review supplements the more detailed schedule review in Section 4.4.

Costs – The WBS costs were reviewed to obtain confidence that the Basis of Estimates (BOEs) were reasonably developed to the appropriate level of detail based on known and anticipated conditions. Larger line item costs were reviewed where appropriate to test the rigor employed in estimating, and in doing so, to gain a confidence in the estimating process. Where possible, comparisons were made of similar line item costs to validate the WBS for internal consistency.

The overall scaling of costs against the WBS schedule was also reviewed to compare the general logic of schedule and cost activity for execution of the WBS scope.

Risks – Finally, the principal scope, schedule, and cost assumptions were identified and reviewed for each WBS in order to assess potential risks to the overall WBS performance. These assumptions and risks were considered both within the integrated scope/schedule/cost framework of the WBS itself, as well as within the overall RFCP scope of activities, in order to evaluate both internal and external risk to the WBS.

Risk Management

The objective of the risk management analysis was to review how K-H undertakes risk management at the Rocky Flats site and to assess the reasonableness of the Schedule Risk Analysis undertaken. This assessment was based on information contained in the Programmatic Risk Management Plan (Revision 0, dated June 16, 1998) and the Schedule Risk Analysis, dated June 30, 1999.

The identification, assessment and management of risk are essential in the effective management and control of projects with the size and complexity of the 2006 Rocky Flats Closure Project. K-H recognizes the importance of risk management and has developed a paper, Programmatic Risk Management Plan (Revision 0, dated June 16, 1999), detailing how risk management principles and techniques have been, and are currently, applied throughout the project. Evidence of quantitative risk management can be found in the various schedules and costs that K-H has so far produced for the project.

Our objective was to assess the reasonableness of the risk management methodology applied by K-H on the 2006 Closure Project by:

- Examining the principles set out in the Programmatic Risk Management Plan
- Reviewing the Schedule Risk Analysis dated June 30, 1999
- Taking into account industry standards and best practice.

In addition to looking at the reasonableness of the methodology, we have also reviewed the application and results of the risk management undertaken within the Schedule Risk Analysis.

We have assessed the reasonableness of the risk management being applied by K-H against current industry standards and best practice as applied to major projects both within and outside the nuclear industry. In the Executive Summary we draw together our main observations of K-H's risk management approach, which are found in Section 4.3, and suggest potential opportunities for improvement in line with industry best practice.

3. CONCLUSIONS

Based on our assessment, we have identified a number of issues and concerns that significantly reduce our confidence that the 2006 Closure Plan, as written, can achieve successful closure in 2006. We wish to recognize the tremendous effort by both Kaiser-Hill and RFFO to develop the 2006 Closure Plan, particularly in light of the large number of unknowns that exist for the closure of a site such as Rocky Flats. We also wish to state that we do not consider any of the issues and concerns listed below to be detrimental to the efforts to close the site by 2006. Nevertheless, we believe that these concerns should be addressed if the 2006 date is to be met.

This section includes only our major concerns and issues. We have included additional issues in the referenced sections.

Schedule

The following schedule points have significantly reduced our confidence in the ability of the 2006 CPB program to achieve closure in 2006:

1. Many of the most important cost and schedule assumptions in the 2006 CPB are centered on closure of the Protected Area (PA). PA closure is driven by two sequences of events, PuSPS and Shipment. We have concerns with these sequences; they contain manual constraints, lag relationships with positive lags and driving Level of Effort (LOE) activities and it appears that PA Closure activities are not tied to all potentially critical areas. If constraints and lags are removed, additional potentially critical logic ties added, and the driving path of the PuSPS revised from Level of Effort activities to detailed work-related activities the critical path, the project approach, and the PA Closure date may change when the schedule is recalculated. We have the following concerns relative to the two sequences leading to PA Closure:

    - Four of the six "Preparation for PA Closure" predecessor activities have been manually constrained so that they will not slip if predecessor activities slip but will only reflect negative float.
    - "Preparation for PA Closure" appears to be directly and logically tied only to Buildings 371/374, 771, 707, and 776/777.
    - The PuSPS driving path to PA Closure is the installation and operation of the PuSPS, processing of SNM Holdup and deactivation of the PuSPS. The driving PuSPS activities appear to be Level of Effort (LOE) type.
    - The Shipment driving path to PA Closure also appears to be mostly comprised of LOE activities. Additionally, many of the driving relationships are Finish-to-Start with a positive lag of 10-to-15 work days.

    The items listed above create unidentifiable or unaccounted periods of time within a critical segment of the 2006 CPB Schedule. If constraints and lags are removed, potentially critical

logic ties added, and the driving path of the PuSPS revised from LOE activities to detailed work-related activities, the critical path and the project approach may change when the schedule is recalculated. The PA Closure date may also be affected. For detailed information, see Section 4.4.2.

2. It appears that many of the SNM Operations, Waste Management (WM) and Environmental Restoration (ER) LOE activities (including surveillance, maintenance, tech support and operations management) do not contain interface logic with the Building Deactivation and Decommission activities. For FY99, FY00 and even FY01, we believe that sufficient information is available to show the appropriate interdependency relationship between the support LOE activities and the appropriate deactivation and decommission activities. Without the appropriate interdependency relationships, the impact of a schedule delay in deactivation and decommission activities will not be identified by WM or ER. For further information see Section 4.4.3.

3. The current process for WM and planning is accomplished through the Waste Generation, Inventory, and Shipping Forecast (WGISF) (see Appendix C) published by the Waste & Remediation Operations Group. This document is a compilation of waste forecasts produced by the Waste Generators, updated monthly, published on a quarterly basis, and provided to Waste Management. The WGISF is the current WM planning and forecasting mechanism and is separate from the 2006 CPB Schedule. Because of this, the majority of the schedule activities within PBD 002 Waste Management Project have been incorporated as a LOE and do not appear to reflect interface relationships between the waste generation areas and the appropriate waste management. The WGISF Process appears to be the best approach at this time for the out-years. However, for FY99 and FY00 there is sufficient information available from the Waste Generation groups for this WM information to be integrated into the 2006 CPB Schedule. For further information see Section 4.4.5.

4. In response to the lack of WM integration logic, ER created its own WM activities for waste treatment and management to represent the interface to the WM effort. Because these ER-created activities are not maintained by WM, this presents the problems listed below. For further information, see Section 4.4.5.

   - WM is not responsible for the status of activities added by ER and therefore they may not reflect the accurate WM status.
   - Since there is no interface logic to the actual WM activities, changes to these activities would not translate to the ER activity forecasts, possibly creating schedule delay and resource planning problems.
   - The ER added activity Original Duration (for WM activities) calculations are not from WM and may not be in accordance with WM assumptions, possibly creating problems with schedule and resource coordination and planning.

5. In the Building Clusters we reviewed the Milestone for "Complete CAT I/II Holdup Removal/Close MAA" is typically forecast months prior to the forecast completion of the

initial physical deactivation. This creates a potential concern of closing the MAA when an unacceptable amount of SNM remains in the building. We also note that DOE's approval/involvement is not clearly identified for the MAA Closure; this appears to be an approval activity that should be explicitly identified in the schedule so it can be planned for and monitored.

6. It is standard scheduling practice to allow schedule logic to drive the activity forecasts as opposed to imposing dates, events or activities in the schedule other than contractual commitments or milestones. Several important activities have manually constrained early start dates thereby forcing the forecast dates to the identified date and not allowing the predecessor activity logic to drive the sequence. This potentially means that the schedule may be manipulated as opposed to being calculated from the activity durations and assigned logic. The addition of unexplained or preferential constraints to the CPM Schedule may produce a biased critical path.

7. The K-H Standard 17 – Schedule Integration states:

   Subcontractor working schedules shall tie directly to the CPB sub-project schedules.

   We have requested copies of the Subcontract working schedules for several of the PBDs from K-H, but we have only received a portion of the WAD 13 PuSPS schedule. We noted that the WAD 13 Subcontractor schedule did not correlate with the 2006 CPB schedule dates for PuSPS Decontamination and Decommissioning, although the PuSPS operation start forecasts did match. When we interviewed K-H staff, we received varying responses as to whether the Subcontractor working schedules tied directly to the 2006 CPB Schedule. While some matched, others did not tie due to reported progress or changes in the 2006 CPB Schedule. This could cause a problem in the coordination of the actual work with the expected work indicated in the 2006 CPB Schedule, leaving open the possibility for resource problems and sequencing issues that could affect the schedule and/or safety. For further information see Section 4.4.3.

8. There are work activities that are constrained to start months (and years in some cases) after the completion of the predecessor activities. Based on conversations with K-H, such constraints are often due to assumed lack of resources or funding. However, this explanation has not been identified in the documentation reviewed. We recommend that the causes of the constraints be identified.

9. Some Milestone activities are constrained to finish months (and years in some cases) after the completion of the predecessor activities. We recognize that the lag may be in accordance with K-H Standard 10 – Scheduling to allow completion of Milestones with a decreased level of risk. However, in some cases the lag appears excessive relative to the Standard's contingency guidelines of 30% confidence level or 10% of the project's duration.

10. The 2006 CPB Schedule does not appear to consistently reflect relationships identifying the transfer of waste operations between buildings, creating the potential for planning and resource coordination problems between buildings.

Cost/Resource Schedule Integration

Based on the procedures we performed to verify cost/resource schedule intergration, it appears that K-H planning and integration team has established useful systems and methods that allow a full system intergration between the Basis of Estimate Software Tool (BEST) and Primavera Project Planner (P3). Our team performed the following procedures to determine the level of intergration between cost, resource and schedule:

- Procedure 1: Interviewed key planning and intergration team members to discern the relationship between the cost and schedule information systems.
- Procedure 2: Performed a budgeted cost comparison test between the BEST and P3 systems on a WAD level.
- Procedure 3: Performed a budgeted cost comparison test between the BEST and P3 systems on an activity and resource level.
- Procedure 4: Tested two estimates generated by the Facility Disposision Cost Model (FDCM) to establish relationship between estimated durations and those shown in P3.
- Procedure 5: Tested two estimates generated through bottoms-up estimating to establish relationship between estimated durations and those shown in P3.

Procedure 1

Through discussions with K-H team members we determined that the BOEs found in BEST are a combination of bottoms-up and top-down estimates provided by Subject Matter Experts (SME) for the scope of work necessary to meet the 2006 CPB. The integration process is intiated and anchored by the most current information within the BEST system from which a customized Microsoft Excel spreadsheet is developed by the Planning and Intergration team. This format is used for an information down-load from BEST.

The information is then sorted and reformated by activity, quanity, manhour, unit cost, and resource within Excel to match parameters set by the P3 batch up-load program. During the batch up-load process any information that is estimated on a total cost basis is assigned a quantity of "1" while costs estimated on a hourly basis are assigned the associated quanity found in BEST for the specified activity. All changes are initiated in the BEST system and are transferred directly into P3 scheduling during regular batch up-load procedures. Our understanding of this process and the funtional relationship of costs and resources from BEST to P3 was used as the basis for performing Procedure's 2 and 3.

It appears that the original activity duration calculations are done independent of the cost and resource activity. This was confirmed through testing the budgeted quanties within P3. In all cases the budgeted quanity per day is a direct result of dividing the total activity resource cost by the duration for that same activiy.

Procedure 2

We performed a comparison at the WAD level to insure that all estimated costs within BEST are being captured and presented in the P3 scheduling system. The method performed included a comprehensive download of cost within P3, by WAD. We completed a comparison to BEST on a line-by-line basis to ensure that all costs were captured. Next, we reconciled the total life cycle budget for the 2006 CPB to guarantee that all costs were captured on a total estimated costs level. No significant differences were identified. The results can be seen in this table:

WAD	Budgeted Cost per Schedule	Budgeted Cost per BEST	Percentage Difference
001	$80,813,613	$80,813,613	0%
002	$28,270,521	$28,270,521	0%
003	No Associated Costs		
004	$167,893,361	$167,893,361	0%
005	$17,046,388	$17,046,388	0%
006	$228,355,834	$228,355,834	0%
007	$25,575,651	$25,575,651	0%
008	No Associated Costs		
009	$2,655,960	$2,655,960	0%
010	$2,447,146	$2,447,146	0%
011	On Hold No Associated Costs		
012	Inactive No Associated Costs		
013	$41,865,429	$41,865,429	0%
014	$40,644,272	$40,644,272	0%
015	$18,141,631	$18,141,631	0%
016	Complete No Associated Costs		
017	$894,801	$894,801	0%
018	Complete No Associated Costs		
019	$4,802,933	$4,802,933	0%
020	$22,803,473	$22,803,473	0%
021	$3,273,400	$3,273,400	0%
022	$31,098,963	$31,098,963	0%
023	$27,911,087	$27,911,087	0%
024	$46,213,536	$46,213,536	0%
025	$142,926,987	$142,926,987	0%
026	Inactive No Associated Costs		
027	$38,086,908	$38,086,908	0%
028	Inactive No Associated Costs		
029	$17,005,651	$17,005,651	0%
030	Inactive No Associated Costs		
031	$212,866,627	$212,866,627	0%
032	$188,372,808	$188,372,808	0%
033	$44,027,426	$44,027,426	0%
034	$147,546,755	$147,546,755	0%
035	$176,282,209	$176,282,209	0%
036	$126,791,576	$126,791,576	0%
037	$30,857,299	$30,857,299	0%
038	$8,220,384	$8,220,384	0%
039	$14,662,520	$14,662,520	0%
040	$212,705,112	$212,705,112	0%
041	$43,058,695	$43,058,695	0%
042	No Associated Costs		
043	No Associated Costs		
044	$438,238,022	$438,238,022	0%
045	$142,074,702	$142,074,702	0%
046	$127,407,228	$127,407,228	0%
047	No Associated Costs		
048	$10,381,551	$10,381,551	0%
049	No Associated Costs		
050	No Associated Costs		
051	$81,000	$81,000	0%
052	No Associated Costs		
053	$165,346	$165,346	0%
054	$13,827,973	$13,827,973	0%
055	$3,814,613	$3,814,613	0%
056	Inactive No Associated Costs		
057	Worked not included in 2006 Baseline Estimate		
058	No Associated Costs		
059	$545,648	$545,648	0%
060	$133,431,352	$133,431,352	0%
061	Inactive No Associated Costs		
062	$90,713,418	$90,713,418	0%
063	$300,693,432	$300,693,432	0%
064	$86,274,479	$86,274,479	0%
065	Inactive No Associated Costs		
066	$11,354,323	$11,354,323	0%
067	$22,963,433	$22,963,433	0%
068	$7,632,545	$7,632,545	0%
069	Inactive No Associated Costs		
070	$4,611,560	$4,611,560	0%
071	$2,677,192	$2,677,192	0%
072	Inactive No Associated Costs		
073	Inactive No Associated Costs		
074	$2,987,480	$2,987,480	0%
075	$8,823,945	$8,823,945	0%
076	$5,742,871	$5,742,871	0%
077	$15,817,679	$15,817,679	0%
078	Inactive No Associated Costs		
079	Inactive No Associated Costs		
080	Inactive No Associated Costs		
081	Inactive No Associated Costs		
082	Inactive No Associated Costs		
083	$87,039,075	$87,039,075	0%
084	Inactive No Associated Costs		
085	$83,903,921	$83,903,921	0%
086	Inactive No Associated Costs		
087	$499,502,330	$499,502,330	0%
088	$15,675,033	$15,675,033	0%
089	$25,640,314	$25,640,314	0%
090	$53,569,630	$53,569,630	0%
091	$216,898	$216,898	0%
092	Inactive No Associated Costs		
093	Inactive No Associated Costs		
094	Inactive No Associated Costs		
095	Inactive No Associated Costs		
096	Inactive No Associated Costs		
097	Inactive No Associated Costs		
098	Inactive No Associated Costs		
BEST and P3 (FY99 thru FY2000) Budgeted Cost Subtotal		**$ 4,389,925,946**	**$ 4,389,926,000**	**0%**
FY 97 and 98 Costs NIC in BEST or P3 in P&I Reporting Subtotal			1,184,004,000
Cost Engineering: RFFO Program			222,964,000
Cost Engineering: Contingnecy			595,149,000
Cost Engineering: Escalation			348,267,000
2006 Plan Grand Total			**$ 6,740,310,000**

BEST vs. P3 WAD Level Comparison

Procedure 3

A budgeted cost comparison was completed between the information found in BEST and that which can be found in P3. Random activities were chosen from P3 and the associated PBD. WAD and WADlet information was searched in BEST to produce the Basis of Cost (BOC) and Basis of Estimate (BOE) for the related activity.

It was expected that the total cost of activities found in both systems should correlate and a ±.5% threshold was used for the comparison basis. At the same time a comparison of resources for the same activities was performed using the resource identification and cost catagory found both within P3 and BEST. Direct resource and quanity relationships in P3 were identified and correlated directly to the hours, lump sum costs, and quanities found within the BOE of the BEST database. We found that no results for the tested activities were outside of the the set comparison range. A sample of these results can be seen below. We conclude that the proper integration is in place at this level.

PBD	WAD	WBS	Activity Identification	Activity Level Comparison is Within Range	Resource and Quantity Relationship Between Systems
14	025	1.1..5.06.04.02	C5331MAPEN	X	X
18	034	1.1.06.10.04.01	D4X7101	X	X
90	009	1.1..04.09.04.05	K0M017515E	X	X
20	009	1.1.04.09.04.07	C0D1108918	X	X

Procedure 4

Review of the schedule and the resources for Building Clusters 111 and 223 indicate low levels of effort have been made by K-H during resource integration with the 2006 CPB schedule (due to the fact that the building is not scheduled to begin decommissioning until Oct. 2005). As a result, the buildings' budgeted cost and related schedule are solely based on the FDCM. The building team has not yet developed a bottoms-up estimate or begun creating their decommissioning schedule. Upon review of the BOEs found in BEST under PBD 014, WAD 025 and Activities C52230APEN & C5117AAPEN, it appears that the durations being applied to "like-scopes" are not identified separately. Instead, the total duration activities have been combined. It appears that once the bottoms-up estimate is complete and a schedule has been generated, the total duration will be allocated accordingly.

Procedure 5

Schedules for Building Clusters 776/777 and 771/774 were reviewed including the methods and resources used to complete the various work sets necessary for the decommissioning of those clusters. It was determined that the durations assigned to the various work sets based on both the crew sizes and the hours required to perform various tasks appear to be reasonable. However, work sets that will not begin until year 2002 and later have loaded the estimated dollar values but have not loaded the related durations.

It is our understanding that if work has a start date out two years or longer they are allowed to apply the "rolling wave" theory. However, based on the extensive amount of detail included in the bottoms-up estimates it appears as though the building team could have provided an accurate schedule for the complete decommissioning of Building Clusters 776/777 and 771/774.

Rocky Flats Cleanup Agreement (RFCA) Compliance

Our review indicated that the overall methodology of the RFCP adheres to the general expectations, goals and direction of RFCA, as evidenced by the following:

- The RFCP incorporates key RFCA activities and processes, such as regulatory milestones and target activities, into the overall project schedule and costs bases.
- The RFCP includes a number specific WBS scopes of work, such as the NA/NFA protocol, that encompass RFCA elements targeted at streamlining the overall scope of cleanup work at the Site.
- K-H project management has already utilized other provisions of RFCA to expedite certain cleanup issues or decision processes. DOE, with support from K-H, has used the RFCA dispute resolution protocol. K-H has also participated in the informal dispute process.
- The RFCP integrates the procedural guidance of RFCA for cleanup decision-making by formally incorporating the use of specific Decision Document protocols, including the PAM, IM/IRA, and RSOP, for all applicable Site actions.

Our review also indicates that, although the RFCP methodology incorporates the principal aspects of RFCA, the character of the interaction between RFCA and the 2006 RFCP will change over time. Because the bulk of the major site risk reduction activities, such as removal of SNM and building D&D, have not yet occurred, most of the key elements of RFCA that serve to expedite the regulatory and management environment of the closure process have not yet been fully tested. For this reason, the interaction between RFCA and the RFCP will become increasingly complex as the closure project proceeds, since the potential for impacts and/or changes to the overall closure project will be greater as the more complicated activities are undertaken. This is especially true for late schedule ER activities. Regardless, the fact that the general methodology of the RFCP incorporates key RFCA guidance and procedures provides greater confidence in the ability of the RFCP to achieve the Site's established end-state.

Site Operations

In the next two years, site operations will have the biggest impact on the path toward closure. However, several limiting factors affecting site operations are reducing our confidence in the 2006 Closure Plan. These include:

*1. **Resource Limits*** – Limited Resources are evident throughout operations. In FY00 every operating project has estimated to increase their required resources. Management is expecting workers to be more efficient and work more overtime, yet workers have little incentive to do so.

Given a strong national and local economy, untrained new hires are becoming more difficult to find. Further complicating the problem, new employees have a six-month mobilization period for security clearance and training.

K-H has not established a structured, concise methodology or process for allocating human resources. If there is one, WAD managers appear to be unaware of it. As an example, we noted that WAD 21 intended to establish a two-shift operation for the resizing of plutonium materials. They have not been able to accommodate a two-shift operation due to limited resources.

2. PuSPS Functionality – Successful implementation of the PuSPS system is crucial to timely completion of the 2006 Plan. The K-H team's concern about the Government Furnished Equipment (GFE) provided by British Nuclear Fuels Limited (BNFL) is well known. The nuclear packaging portion of the BNFL equipment was approved as GFE, the stabilization portion was not. K-H was contracted by DOE to design, fabricate, and construct new stabilization machinery. Additional testing performed at the request of K-H on the nuclear packaging system appears to have demonstrated that the system is less dependable than planned and would likely be prone to frequent breakdown requiring high maintenance.

K-H has proactively initiated design modifications that incorporate new methodologies to address potential contamination problems. We believe that K-H has taken appropriate and prudent action with respect to modifying or improving the PuSPS; however, in light of the acknowledged problems, the level of confidence in the system is very low.

3. BOE Risk Factors - The risk factors related to cost, schedule and technological difficulty are inconsistently applied in the Basis of Estimate (BOE). In a number of interviews, WADlet managers stated that they did not understand why risk was applied to what otherwise appeared to be non-risk issues. For example, we noticed inconsistencies where cost estimates based on historical cost data were given high risk factors that K-H could not substantiate. In addition to this, we have found that estimators and/or analysts are already factoring cost and schedule contingency into their baseline costs. The BOEs were intended to represent "optimal" (i.e., standard) planning. Instead, they have come to represent something more indicative of "worst-case." If the sample-set is indicative of WADlet manager protocol, the risk factors may be redundant.

4. BOE Logic vs. Protocol – It is our understanding that the BOEs are intended to be self-contained, that is, they are a stand-alone means of explaining the bases of estimates. In our view, the narrative description for the BOEs is not well substantiated, especially in light of K-H's long history at the Site. While activities are usually segregated in a rational manner, the support for the work flow is not clear, particularly where historical cost bases are provided. For example, sometimes the work narrative refers to an accounting charge code as the basis for cost. However, accounting charge codes are not always recognized in the BEST system (after account closure); as a result, the correlation between cost estimates and associated work is sometimes weak.

Because the BOE is divided to show activity year-on-year, the logic appears contrived. We noted that the narrative and the quantitative bases were replicated (cut and pasted) year after year

irrespective of level of activity. To affect a "level of effort" change, a factor is sometimes applied across all resources within an activity. While this is not inappropriate from a work-logic standpoint, the narrative support is weak and appears to have little to do with the anticipated work flow.

Decontamination and Decommissioning

During our review of the decontamination, decommissioning, demolition, and disposal portions of the 2006 Closure Plan, we developed concerns about definitions and protocols for deactivation. While RFCA explicitly states what deactivation does not include, there does not appear to be a written protocol to diminish the "gray area" between deactivation and decommissioning within the PBDs or BOEs.

Deactivation is scheduled to be dove-tailed with other activities occuring in building clusters and is to occur simultaneously with NucOps, decommissioning and demolition. The work is organized in sequential sets. The sets are prioritized in a logical manner. We concur with DOE the facility disposition process should be broadened to provide guidance or direction on deactivation. We noted that the characterization of deactivation activities is not consistently defined across the two PBDs that we reviewed.

Ill-defined processes may lead to Planning and Integration problems. For example, some building clusters contain highly contaminated areas (HCAs) where supplied breathing air (SBA) is required. Neither the PBD nor the WADlets therein specifically address deactivation hold-up uncertainties and characterizations. As known problem areas, greater scrutiny and contingency planning to identify, document and plan for unforeseen site conditions would be expected.

We also noted that K-H identified no deactivation-specific assumptions. That is, their assumptions pertained to external factors that do not address risks associated with problem areas such as the HCAs.

Our review of the cost estimation tools, including the Facility Disposition Cost Model (FDCM) and the bottoms-up cost estimates resulted in the following comments regarding the strengths and weaknesses of the estimating models:

Strengths

- The FDCM serves well as a rough order of magnitude estimate. It provides useful information necessary to determine resources and funding forecasts, when utilized it is a useful benchmarking tool against bottoms-up estimates.
- Rocky Flats D&D historical cost information has been incorporated into estimates and provides a strong basis for estimated costs.
- Adjustment factors (up/down) have been applied to identify expected learning curves, high levels of safety, complexity of work, and inefficiencies produced during constrained working conditions.

- D&D forecasts clearly identify scope of work and define all exclusions and assumptions made during the cost estimating efforts.
- Consistent use of unit costs has been demonstrated within individual "top-down" and "bottoms-up" estimates which are updated as new information is discovered.
- Technology (BEST) has been used effectively, and accurately reflects total estimated costs produced by building estimators and the FDCM development team.

Weaknesses

- The "bottoms-up" estimates apply historical data generated from K-H's current cost reporting systems. As a result the cost control and reporting methods used provide weak support for their estimated costs.
- Due to the lack of cost information available, K-H's bottoms up estimates do not seem to make many provisions for scope uncertainties or the level of effort required for known scopes of work. K-H assumes that the project contingency will be used for all scope uncertainties rather than applying risk factors to the estimates.
- In terms of cost control and reporting effort, there is little evidence that K-H has made the transition to a deconstruction contractor. As the site moves away from being an operating facility and more towards a deconstruction project the level and type of cost control and reporting needs to become more focused on unit costs, thereby allowing management to better identify areas where increased efficiency is needed.
- There is inconsistency with the methodology used in developing the estimates. As the site becomes a decommissioning and deconstruction project, we observed that K-H does not use consistent procedures for the development of the various bottoms up cluster estimates. Because there are no established procedures, it becomes difficult to use one building's information for another building.

Waste Management

The current scope of the WM component of the RFCP addresses a wide range of technical waste characterization, handling, packaging, transportation and disposition and/or disposal issues. In general, the activities contained within the various WBS elements are appropriate to an integrated site waste management program. The technical bases for allocating specific activities and costs are sound. They reflect a good understanding of the nature of materials to be addressed, the technical closure activities that produce wastes and the general uncertainties inherent in many of the waste generating activities, both in waste volumes and disposal issues.

A principal concern is that WM baseline schedule reflects only a LOE forecast and fails to capture the true profile of potential work to be performed. This is substantiated by the fact that K-H uses a separate management tool to forecast waste volumes (i.e., the monthly *Waste Generation, Inventory and Shipping Forecast*). To the extent that the LOE baseline schedule

fails to reflect the WM work effort as presented in the *Waste Generation, Inventory and Shipping Forecast*, so to will the LOE baseline costs fail to reasonably reflect future costs.

Many of the key uncertainties associated with the execution of the WM component of the RFCP have been identified, however, a number of significant issues have not been adequately factored into the overall WM planning. The principal uncertainties related to the WM program include the timely availability of offsite waste disposal facilities, the uncertain volumes of wastes to be generated from the D&D and ER activities, and uncertainties related to the achievement of D&D and ER schedules.

PBD 003 includes contingencies for the construction of onsite waste storage in the event that offsite disposal is not available on a timely basis. However, the bases of estimate or the WM scopes of work do not include line items to accommodate the uncertain volumes of waste to be generated from D&D and ER activities. These uncertainties could present potentially significant impacts to both the cost and schedule of WM activities, the availability of resources, and could exacerbate other onsite and offsite waste handling and shipment issues. It is not clear whether adequate contingencies are in place to address the potential impacts of these uncertainties.

Many of the principal WM risks to schedule are due to offsite factors. Onsite risks to schedule include impacts from changes to the schedules of the key waste generating activities. Delays in receiving wastes from these activities, particularly those activities occurring late in the project schedule would potentially impact the WM program's ability to meet the waste disposal and site end-state goals. Although these risks have been identified, it is not clear whether defined contingencies are incorporated into the overall schedule planning.

Environmental Restoration

The PMP lists seven principal assumptions for ER. The findings for five of the seven assumptions indicate that the 2006 CPB is at risk because the assumptions are overly optimistic. We recommend that Contingency Management and Earned Value Analysis be added to K-H's Project Controls to add focus to their management of these assumptions. We further recommend that the ER segment of the overall program be reviewed to determine which ER activities should be performed earlier in the overall Rocky Flats closure program in order to reduce risk in later stages of the program.

The five assumptions and our findings that reduce confidence in the 2006 Closure Plan are:

1. *Only the IHSSs/Potential Areas of Concern/Under Building Contamination listed in the Lane Butler to Allen Schubert Memorandum (JLB-013-99), dated April 6, 1999, will require remediation.*

This assumption does not recognize a number of potentially significant unknowns related to the overall project. There is a potential for the discovery of additional areas of contamination during other scheduled cleanup activities that could impact the overall scope, schedule and cost of the ER efforts.

2. *No Further Action (NFA) sites will be identified and dispositioned as defined in Attachment 6 to RFCA. The NFA sites to be dispositioned will be those described in the Lane Butler to Allen Schubert Memorandum (JLB-023-99), dated April 6, 1999.*

Because of the "best judgement" basis of many of the initial proposed NA/NFA decisions, there is significant potential cost and schedule risk with IHSS's sites that have been proposed for No Action/No Further Action. If a portion of the 148 sites pending NA/NFA approval, or the 81 additional proposed NA/NFA sites, are not approved by the regulators, then the ER costs and schedule will be adversely impacted.

3. *ER soil action levels will conform to the final Action Levels for Radionuclides in Soils for the Rocky Flats Cleanup Agreement, October 18, 1996. (All soils with radioactivity less than Tier 2 levels, as defined in RFCA [Attachment 5] can be returned to the remediation site.)*

This assumption does not account for other cleanup levels that may result from the efforts of the Actinide Migration Evaluation Program, which may dictate additional scope related to soil removal and contaminant control activities in order to meet soil cleanup levels that are protective of downstream surface and groundwater quality.

4. *The appropriate regulators will approve the use of engineered caps as an integral part of the Site's closure strategy for landfills, for the Solar Ponds, and for areas within the Industrial Area, including the 700 Area.*

The final decision for closure caps for the landfills, solar ponds and Industrial Area may have cost and schedule risks that are not accounted for in the existing RFCP. The closure caps are assumed to be an evapo-transpiration (E-T) design. RFCA requires the caps to be RCRA-equivalent. The pertinent regulatory agencies have not yet accepted the E-T design as RCRA-equivalent. Planning and cost estimates assume that the overall cap structures will be similar to the cover tentatively approved by CDPHE for use at Rocky Mountain Arsenal. It is not clear that alternatives have been fully developed for alternate design of the caps if the E-T design is not approved for RFETS. Potential impacts could include increased cost of cap materials, increased time for design and approval, and impacts to cap construction implementation schedules.

Additionally, specific sources of soil for the closure caps have not been located or placed under contract or commitment. Although the RFCP indicates that soil will be obtained for closure caps from local sources within ten miles of the site, it is not clear that the availability of adequate volumes within that proximity has been evaluated. It is not clear that roadway access to the site, increased traffic volumes, and other transportation infrastructure issues related to the movement of large amounts of soil for the closure caps has been fully evaluated. These issues could create potentially significant schedule and cost impacts to the capping activities.

5. *The appropriate regulators will approve changes to the environmental site remediation schedule to accommodate acceleration of other RFCP activities, such as nuclear material stabilization and D&D.*

Due to the late schedule of ER activities within the overall RFETS cleanup plan, the time required for regulatory review and approval of ER remedial actions may become a critical issue.

Accomplishment of ER work within the existing baseline schedule could be seriously impacted if agency reviews and approvals are delayed or prolonged.

K-H and DOE are currently discussing with the regulatory agencies the possibility of developing an expedited decision document process, in order to reduce agency review and approval time. Under this concept, agency requirements for multiple sets of decision documents would be combined into a single, more comprehensive "super" decision document. The current project baseline schedule shows five Record of Decision (ROD) for site closure, and one full set of decision documents per ER work group. Cumulatively, this represents a total of 58 sets.

Resource and Management Plan Issues

Risk Management

K-H states in the Summary Risk Information (Section 2.2.1) that they 'calculate a 7% probability for Milestone 99 "Site Closure Complete" to occur by December 2006.' However, K-H also states that the frequency histogram '... illustrates the probability of Milestone 99 "Site Closure Complete" occurring during the period October 2006 and October 2007.'

To summarize, the probability of the project being completed by 2006 is very low but there is a 100% probability that the project will be complete by October 2007. We have serious reservation about the validity and reasonableness of the Schedule Risk Analysis results due to:

- The qualifications stated in the Schedule Risk Analysis concerning Additional Schedule Risk Issues and Elements of Schedule Risk.
- The apparent absence of consistent logic and constraints within the project schedule.
- The use of critical path and near critical path activities only in the quantitative analysis.
- Lack of apparent interdependency relationships within the quantitative analysis.

Uncertainty relates to the durations and resources associated with the "best estimate" or most probable activities. Risk relates to the less probable activities should they occur. Schedule uncertainty and schedule risk management should precede and feed into cost uncertainty and cost risk management.

Schedule uncertainty inherent in the most probable activities in the 2006 Closure Plan has been addressed but in a largely ad-hoc manner. Our review of the updated report issued August 30 does show improvement. However, we noted that little regard has been taken of the cost uncertainty inherent in the most probable activities; a blanket cost contingency has been used instead.

No structured attempt has been made to reflect the consequences of the risks if less probable and generally less favorable activitiy streams may occur. In other words, K-H has not carried out adequate structured project risk and uncertainty management. This is evidenced by the lack of:

- Risk portfolios
- Risk management plans
- Calculated schedule and cost contingencies at the WAD level
- Contingency management program
- Earned value analysis

Funding Profile

It appears that K-H has only considered the two possibilities: the projected funding profile from the 2010 plan, and unconstrained funding. We recommend that they consider whether additional funding applied to areas such as Environmental Restoration planning and permitting would improve the likelihood of successful closure in 2006.

Critical Task Management

When the WBS was developed, K-H decided to break down most of the major tasks on a building by building basis. There were good reasons for this, and we are not recommending that the WBS be changed. However, a WBS that has been developed on a building or location basis makes it more difficult for a project to organize and manage processes that cut across many buildings or locations. For example, PA closure is a major process and achieving PA closure as scheduled is very important to success of the 2006 Closure Plan. However, because this process cuts across many PBDs, WADs, and buildings, it is harder to manage and critical path schedule development for this process is weaker than if the WBS had been done on a major work process basis. WM and ER activities also cut across many PBDs, WADs, and locations.

It appears that K-H and DOE will be required to increase the management attention paid to major processes such as PA closure and WM, to overcome the bias of the WBS towards performing work by location.

Contingency Planning

The Project Management Plan (PMP) includes a section on Contingency Planning. However, during our document reviews and interviews, we did not see any evidence of a contingency planning process. The PMP includes contingency action tables for SNM and waste tasks, but the contingencies identified are relatively general, the resulting actions have not been developed in all cases, and the contingencies discussed only cover a small portion of the contingency planning that is necessary for the RFCP.

We recommend that a contingency management process be established. This process should include management and technical staff from both K-H and RFFO, and should meet and report on a regular basis. We believe that a rigorous contingency management process is essential for success on this project due to the large number of unknowns and prototype operations.

We also note that the overall budget for the RFCP has a contingency identified, and that this contingency is carried at the project level. We agree that the contingency budget should be carried at the project, or WAD, level, but again we did not see any evidence that a process exists to manage the contingency budget. We recommend that this process be established, and that it include both DOE and K-H management. With the large number of uncertainties and contingent items in this project, it is essential that the contingency money be applied to the appropriate activities, and that the money be applied to activities that are on the critical or near-critical schedule path.

Performance-Based Incentives

K-H has performance-based incentives as part of their contract. We agree that performance-based incentives are a very good management tool, and we commend DOE for applying them to the RFCP. We did not perform a detailed review of incentives, but we did note two areas for improvement.

The incentives are developed on an annual basis, based on fiscal years. This creates the danger that short-term incentives will either create future problems as short-term items are completed in a way that increases future difficulties, or will postpone difficult tasks into later years so that easier milestones can be achieved in the short term. For example, a short-term demolition milestone might be achieved at the cost of an unreasonable increase in LLMW volumes. We also noted that there were no incentives for such things as staff retention, even though resources are critical to success of the RFCP.

We recommend that the incentives be reviewed and developed on an overall RFCP basis, then developed and implemented in more detail on a fiscal year basis. The incentives can then be structured in a way that mitigates the risks of too much focus on short-term incentives. We also recommend that a portion of the incentives be focused on resource development and retention and on increased resource productivity. We have identified the potential lack of human resources as one of the highest risks to success, therefore we recommend that the management contractor be given incentives to improve this situation.