



Office of Environmental Management
Project Critical Decision Assessment Tool
(EM Project • CDAT) Manual

Office of Project Management, EM-5.22
U.S. Department of Energy
October 2019

Revision 0

TABLE OF CONTENTS

1.0 Introduction/EM CDAT Purpose.....	1
2.0 EM CDAT Description/Development of Scoring System.....	3
2.1 EM CDAT Elements.....	3
2.2 EM CDAT Element Definitions	4
2.3 Selecting the Appropriate CDAT Spreadsheet	4
2.4 EM CDAT Maturity Values	5
2.5 Scoring the Project.....	6
2.5.1 Scoring System Basis	7
2.5.2 Project Score.....	8
2.6 Applicable and Inapplicable Elements.....	8
2.7 Who Should Perform the EM CDAT and How Long Does it Take?.....	9
3.0 Applicability and Use of the EM CAT	12
3.1 Types of EM Projects for which the EM CDAT is developed.....	12
3.2 Critical Decisions (CDs).....	14
3.3 EM-5.22 Independent Project Reviews (IPRs), Field Office Assessments and contractor Self-Assessment Reviews	15
4.0 EM CDAT Elements/Definitions for Construction Projects.....	17
5.0 EM CDAT Elements/Definitions for Environmental Restoration Clean-Up Projects.....	42
6.0 EM CDAT Elements/Definitions For D&D/Disposition Projects Accomplished Under DOE Or NRC Regulations (Not Under CERCLA).....	62

TABLES AND FIGURES

Table 2-1 Number of Elements by Project Type	3
Table 2-2 Maturity Value Rating Criteria.....	6
Table 2-3 Summary of Project Management Review Requirements.....	10
Table 3-1 Capital Asset and Project Definitions.....	12
Table 3-2 Criteria for Selecting the Appropriate CDAT Spreadsheet	14
Table 4-1 EM CDAT Elements for Construction Projects	17
Table 4-2 EM CDAT Construction Project Definitions and Target Score Criteria	22
Table 5-1 EM CDAT Elements for Environmental Restoration Projects.....	43
Table 5-2 EM CDAT Restoration Project Definitions and Target Score Criteria	48
Table 6-1 EM CDAT Elements for D&D/Disposition Projects (Non-CERCLA)	62
Table 6-2 EM CDAT D&D Project Definitions and Target Score Criteria.....	66

1.0 INTRODUCTION/EM CDAT PURPOSE

The EM Project Critical Decision Assessment Tool (CDAT) evolved from the EM Project Definition Index Rating (PDRI) created in 1999. In FY 1999, the Congressional Committee Conference on Energy and Water Resources directed the Department of Energy (DOE) to have an independent expert review of DOE's structure and process for managing its projects. In response to this request, DOE asked the National Research Council (NRC) to review and assess the procurement and management of DOE's major construction projects, as well as its environmental restoration and waste management projects. In July 1999, the NRC published a report entitled *Improving Project Management in the Department of Energy*. In general, this report was very critical of DOE's project management efforts with one of the principal concerns being the lack of up-front planning.

In response to this report, a working group was formed consisting of experienced project management professionals representing a cross-section of federal and contractor project management expertise from across the DOE complex to address project planning needs for the Environmental Management' (EM) Program. Among other actions, this group developed an EM version of the PDRI (EM PDRI) using a methodology somewhat similar to the Construction Industry Institute's (CII) PDRI. This was the predecessor to the CDAT. Revision 0 of the original EM PDRI, (now the EM CDAT), was issued on March 6, 2000. The EM PDRI was developed for the specific purpose of improving project planning in EM by facilitating the assessment of project maturity for achieving the four Critical Decision (CD) levels defined in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, and its associated manuals that define capital asset project requirements for all project phases. Today the EM PDRI has evolved into the CDAT which incorporates DOE Order 413.3B, as well as EM-specific requirements and includes feedback from the EM Consolidated Business Center (EMCBC), EM Applied Cost Engineering (EM ACE) team members, EM cost estimators and other EM users.

The EM CDAT is a project management tool that provides a numerical assessment of how well a project meets the requirements for each CD level determined by evaluating specific project information. The rating is determined by evaluating a range of project management (Key Elements) in the areas of Cost, Scope, Schedule, Management Planning and Control, and Safety. EM has found this tool (as the EM PDRI) to be very effective in assessing if a project has met the degree of maturity necessary to achieve a CD level and its "readiness to proceed" to the next project phase. EM also has found that the project CDAT Elements (as updated from the PDRI) provide a good checklist or road map for planning future project activities.

As with the initial EM PDRI, the EM CDAT scores are used to assess readiness to proceed for CDs prior to actual construction/remediation. The CDs for all three types of EM projects (Construction, Environmental Remediation, and Non CERCLA - Decontamination and Decommissioning (D&D) along with the expected EM CDAT score for that project phase are discussed in detail throughout this manual. EM uses the expected EM CDAT scores as an important factor in the decision to proceed to the next project phase. By longstanding historical EM practice, projects that are more than 5% (or 50 points at CD-3) below the expected score for that project phase should have justification for the reduced score at the Environmental

Management Acquisition Advisory Board (EMAAB) or Energy System Acquisition Advisory Board (ESAAB) briefing. Similarly, any low scores for specific critical Elements (e.g., Mission Need Statement at CD-0) should also be discussed at the EMAAB/ESAAB.

2.0 EM CDAT DESCRIPTION/DEVELOPMENT OF SCORING SYSTEM

The summary descriptions and instructions for using the EM CDAT are given in the subsections as described below.

- 2.1 EM CDAT Elements
- 2.2 EM CDAT Element Definitions
- 2.3 Selecting the Appropriate CDAT Spreadsheet
- 2.4 EM CDAT Maturity Values
- 2.5 Scoring the Project
- 2.6 Inapplicable Elements
- 2.7 Who Should Perform the EM CDAT and How Long Does it Take?

2.1 EM CDAT Elements

Since there are three types of EM Capital Asset Projects (Construction, Environmental Remediation) and Non CERCLA D&D, there are three associated CDAT tools for each type of project. All three CDAT tools are comprised of five Key Element Groupings or rating areas. These five rating areas are: 1) Cost, 2) Schedule, 3) Scope/Technical, 4) Management Planning and Controls, and 5) Safety.

For each of the project five Key Element Groupings/rating areas, there are individual Elements that, in total, provide a good indication of project planning maturity at each phase of the project. The number of Elements in each grouping/rating area varies for each of the three tools depending on the type of project. A summary of the number of Elements for each of the three CDAT project type tools is given in table 2-1. The specific Elements, and their definitions, for each project type are provided in Sections 4.0, 5.0, and 6.0.

Table 2-1. Number of Elements by Project Type

Rating Area	Construction Projects	Environmental Restoration Projects	D&D (Non-CERCLA)/ Disposition Projects
Cost	7	7	7
Schedule	7	7	7
Scope/Technical	35	26	21
Management Planning and Control	21	20	20
Safety	4	4	4
Totals	74	64	59

2.2 EM CDAT Element Definitions

Elements that apply to an aspect of a project are grouped together in a logical sequence within the five Key Element Groupings/rating areas. Associated with each Element is a definition that provides the criteria for achieving the maximum score (“5”). The one exception to this rule is Element A-1 *Cost Estimate*. Here the five classes of cost estimates are aligned with the five levels of maturity values so that all five levels of maturity value are actually defined. The criteria/definitions for each Element are generally qualitative and are subject to change as the underlying requirements change and as experience gained in the use of the EM CDAT may dictate.

Because of the sheer volume, it is not possible to provide comprehensive and detailed definitions that are fully meaningful to the wide range of activities that are represented by the CDAT Elements. Because these criteria/definitions must be brief, they require the assignment of an appropriate Subject Matter Expert (SME), knowledgeable in that element’s subject area (e.g. nuclear safety, electrical/mechanical design, etc.), to correctly perform the actual project scoring. The element definitions are too brief to be useful to an individual who is unfamiliar with that subject area. The definitions provided in the EM CDAT tools are meant to establish the basis for an SME to determine that an Element is fully mature and, as importantly, meets the specific requirements contained in the Regulations, DOE Orders, Standards and Guides that pertain to that element.

2.3 Selecting the Appropriate CDAT Spreadsheet

There are three CDAT spreadsheets associated with the three types of EM projects. The first is entitled, “Traditional Construction Projects (Nuclear, Non-Nuclear)” and should be used if the project being reviewed has conventional construction as its main component. The second spreadsheet is entitled, “Environmental Restoration Projects -CERCLA/RCRA (Including D&D Projects accomplished under CERCLA)”. This spreadsheet should be used when environmental remediation (restoration) or decontamination and decommissioning (D&D) conducted under the CERCLA/RCRA regulatory regime are the major activities. The third spreadsheet is entitled “D&D Projects accomplished under DOE or NRC Regulations.” This spreadsheet should be used where D&D/Facility Disposition projects are conducted under NRC regulations or under DOE regulatory authority as the major activities.

It should be noted that none of these spreadsheets adequately accounts for the particular differences that would be encountered in a Design-Build (D-B) acquisition strategy. This is because in D-B acquisitions (as opposed to the more conventional Design/Bid/Build), the subcontractor is responsible for the creation of many of the important project documents after the bid has been awarded. The CDAT definitions assume that most of these documents will be generated before the bidding process and, therefore, scores for D-B projects may be lower than the maturity of the project warrants. These differences should be fully explained in the review report that accompanies the CDAT review. This is also true for components procured through a “performance specification.” The actual design will be completed after the procurement is made.

2.4 EM CDAT Maturity Values

The EM CDAT Maturity Value provides a numerical rating (from 0 to 5) based upon the maturity of each particular Element, as provided by each Element's definition. This ranges from a "0" value, which means that the criteria embodied in the Element definition is not met at all, – to a value of "5" meaning full compliance with the Element definition criteria - a fully satisfactory end state. In general, Maturity Values should be developed using both qualitative and quantitative criteria listed in Table 2-2 with the Element definitions. It is important that the maturity score represent the degree to which the content being reviewed satisfies EM's expectations at this phase in the process, and not a reviewer's personal preferences or the presentation format or style. A value of "5" simply means that the project has met that element's criteria. (Note: Ultimately, as explained in Section 2.4, the Maturity Value rating is multiplied by a specified weighting factor to obtain the actual EM CDAT score for each Element).

For some EM projects, a particular criteria may not be applicable. In that case, an "N/A" should be entered as the maturity value on the CDAT spreadsheet. So that the overall scoring will remain the same, the other criteria weights in that Grouping will then need to be adjusted accordingly.

The Maturity Value rating should be recorded on the EM CDAT spreadsheet. During the course of an internal or Independent Project Review, the assessor's initial Maturity Value ratings for an element on the spreadsheets may be changed by the assessor based on input from the Team Leader and/or from other team members who may bring additional project information to light.

It is important that reviewers carefully read the criteria for each element. In many cases there are vastly different criteria from element to element. Some elements, such as those in the cost estimate Key Element Grouping, a CD-1 score of only 2 is expected. Others, such as Alternatives Analysis or Conceptual Design Report, which are complete at CD-1, a 5 is the expected CD-1 score. Also some criteria re-set at each CD level. For example, design reviews (Construction CDAT Element C24) must be repeated for each major design phase to score the full maturity value of 5. (i.e., a proper independent Conceptual Design review would earn a rating a 5 at CD-1. But it would have little or no value toward the required independent design review needed at the CD-3 Final Design phase.

For each of the CD levels, the spreadsheet provides "expected" maturity values that should apply to most projects. Depending on the phase of the project, these values can be used as a guide for what score to expect at each project phase.

For example, a Maturity Value rating of "1" for the Element "Cost Estimate" during the Pre-Conceptual Design phase (CD-0) is the "expected" rating (i.e., the element matches expectations for that phase of the project). However, a Maturity Value rating of "1" at the end of the Preliminary Design phase (CD-2) would indicate a potentially serious project deficiency. Similarly, a Maturity Value rating of "5" is expected to be applied at CD-0 (and for all subsequent CDs) for all Elements that are fully defined during the pre-conceptual phase of the project, such as the Element "Mission Need". Normally, the "expected values" column should not be changed by the review team. For some especially unique projects, an occasion may arise where some of these expected values may need to be adjusted to be appropriate for an Element at a particular CD phase.

Important Note: these changes to the expected values should only be done for truly unique project reasons and approved by the appropriate Field Office managerial authority.

For those projects where the subcontractor is responsible for providing critical project documents (e.g., Health and Safety Plan, Quality Assurance Plan, etc.) after the bid award, (such as with D-B projects), a maturity Value rating of “5” is acceptable, provided that the requirements are fully and completely communicated in the contracting documents (e.g., special conditions, drawings, specifications, etc.).

While Table 2-2 criteria are used in assessing the Maturity Value of various Elements, the Project Manager/staff or the independent Review Team scoring a particular Element are free to use some discretion based upon supporting documentation. For example, where the preparation of a project-specific Quality Assurance Plan may not have been started, but a documented and approved site-wide Quality Assurance Program is in place and fully implemented, the reviewer may assign a Maturity Value of “1” or “2” to the Quality Assurance Project Plan Element even though that document doesn’t yet exist due to the overall maturity of the site quality management system.

The Maturity Values ratings for each of the Elements are used to determine the subtotal CDAT score for each Key Element Grouping, and the overall score for the project as a whole, as described in Section 2.5. For determining the maturity value score based on progress toward meeting any Element’s criteria, the values in Table 2-2 should be used.

Table 2-2. Maturity Value Rating Criteria

Maturity Value Rating	Qualitative Criteria	Quantitative Criteria (% Complete)
N/A	Not Applicable	-
0	Work Not Started	0
1	Work Initiated	1-20
2	Concept Defined	21-50
3	Substantive Working Detail	51-80
4	Final Draft	81-95
5	Complete/Fully Meets Definition Criteria	96-100

2.5 Scoring the Project

Each Maturity Value rating (“0” to “5”) for each Element is multiplied by a weighting factor based upon the importance of that Element relative to the others within that Key Element Grouping and to the project overall. This is reflected in two levels of priority: “H” designates a high priority Element. A “P” designates a pro-rated Element. The weight of these priority factors varies according to a variety of factors that are not consistent or predictable across all three of the project-type CDAT tools because of the vastly different importance of certain Elements between the three EM project types.

2.5.1 Scoring System Basis

The underlying basis of the EM CDAT weighted scoring system is:

1. The overall maximum score is 1000 points at the completion of the project final design phase for CD-3, reflects an ideal, fully mature project at a stage just prior to achieving CD-3, *Approve Start of Construction/Execution*, where the project is ready for implementation with a maximum Maturity Value rating (i.e., “5”) assigned to each Element.
2. The maximum score for each Key Element Grouping (e.g., Cost, Schedule, etc.) was established principally by considering both the number of Elements in each Key Element Grouping and the relative importance of the Elements for defining a successful project. For example, for an EM construction project at the final design completion phase (CD-3), the distribution of the 1000 points for each of the Key Element Groupings, and the acceptable range of scores for each of the five Key Element Groupings in the Construction CDAT tool, is shown in Figure 2-1.

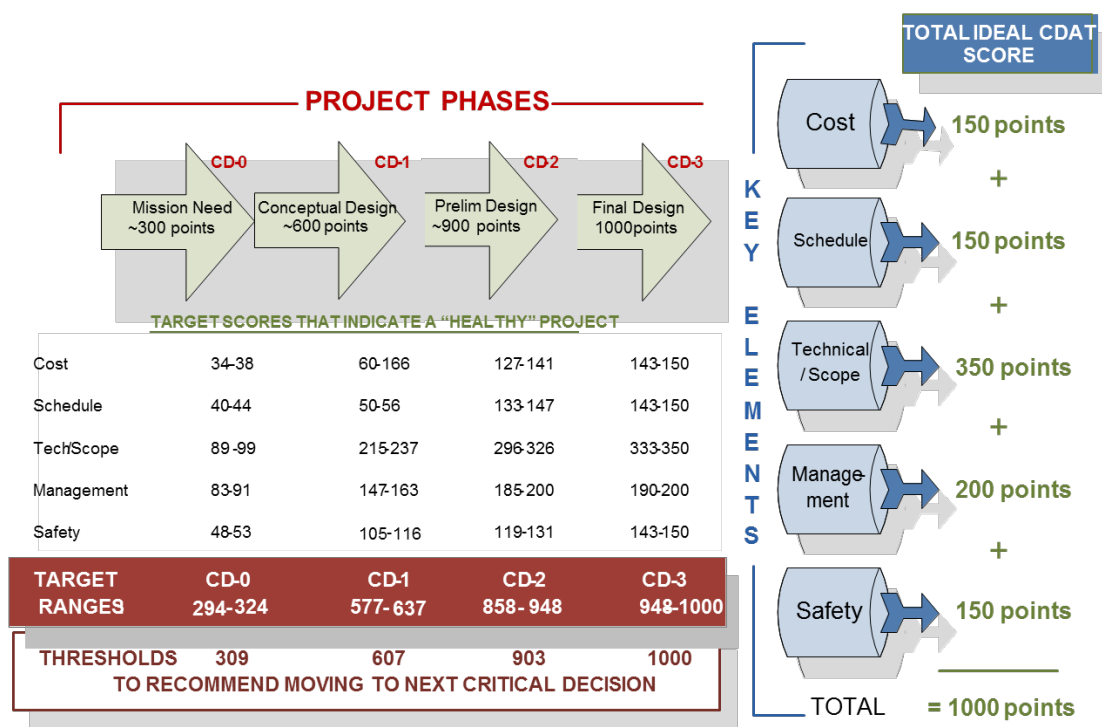


Figure 2-1. Maximum and Target Scores for Key Element Groupings (EM Construction Projects)

3. The overall “targeted” score ranges depend on the project phase as indicated in figure 2-1 for Construction Projects. The scoring sheets and criteria basis for each of the approximate “targeted” score ranges shown below can be found in Sections 4.0, 5.0 and 6.0.
4. Some Elements are more important than others, and such elements are designated as high priority (“H”). The combination of all “H” Elements for a given Key Element Grouping receives approximately 50 percent of the points for that Key Element Grouping. For example,

Elements designated “H” for the “Cost” Grouping for Final Design (CD-3) would have a total value of 75 of the total 150 points for that Element Grouping. All of the “P” Elements would also total 75.¹

5. To account for the fact that some elements may not be applicable (i.e., N/A) for various projects, and to maintain consistent “targeted” scores for each Key Element Grouping (e.g., ~300 points for Pre-Conceptual under Construction Projects), Elements not designated by an “H” are designated by a “P” (are pro-rated). The use of “H” and “P” weighting allows for keeping the “targeted” score the same, while accounting for the fact that some Elements are more important than others. (See Section 2.5.2 for an explanation of “Target Scores.”)
6. For the Preliminary Design Phase of a Construction Project (CD-2), the target score is set at approximately 900 points out of 1000. In terms of the actual work effort for a Construction Project, the completion of the Preliminary Design phase is approximately 35 percent of the total design effort. However, the EM CDAT target score is set at approximately the 90 percent level to ensure that the planning and preliminary design effort will provide a more accurate performance baseline.

Target scores are those scores for an Element that are expected at a given phase of each project. Based on the above, projects are scored and then compared to “targeted” values. Taken in their entirety, target scores provide a good indication of how well a project is actually defined versus how well it should be defined at any given stage. Target scores increase from early to later phases of a project, and cannot be changed by the assessor. Elements that are expected to mature more slowly and at a later phase will have correspondingly lower target scores at the early stages of the project. Target Scores are presented in Figure 2-1 and are locked onto the EM CDAT spreadsheets.

2.5.2 Project Score

For each Element the actual score is determined by multiplying its Weighting Factor by the appropriate Maturity Value rating that has been assigned to it by the reviewer. After each Element score is calculated, the score for each Key Element Grouping (Cost, Schedule, Scope/Technical, Management Planning and Control, and Safety) and the Total Project Score are totaled.

2.6 Applicable and Inapplicable Elements

The scoring spreadsheets show some Elements target maturity values as “N/A” in the earlier project phases. This is because not all Elements are applicable to all phases of the project. Adjustments have been made so that this does not affect the overall CDAT score.

Certain Elements are not expected to be completed (or even started) at early stages of a project. For these Elements, the expected Maturity Values in the CDAT rating sheets are shown as an “N/A.” When scoring those elements where the expected maturity values are indicated as N/A, a zero (0) should be entered as the maturity value in the project’s maturity rating column. The key Element Grouping “expected” subtotals and the “expected” grand totals already reflect zeros as

¹ This works well as long as the number of “P” Elements outnumbers the number of “H” Elements for any given Key Element Grouping. If there are an equal number or greater number of “H” Elements than “P” Elements (in the instance where some “P” Elements were considered N/A or were not rated) for any given Key Element Grouping, the automated version of the spreadsheet automatically adjusts the weighting factor to give more weight to the “H” Elements.

expected maturity ratings for these N/A elements. However, when customizing a CDAT rating sheet for a particular project, adjustments will need to be made for any additional inapplicable (N/A) Elements. In those cases, inapplicable (N/A) elements will need to have their weighting factor(s) eliminated from that Element and redistributed to the remaining elements in that grouping so that its elimination does not negatively affect that grouping's or the overall scores.

Prior to using this CDAT system for a specific project, all Elements should be reviewed for applicability. If a particular Element is not applicable (N/A) for the specific project, it should be so noted and the weights of the other Elements be re-calculated to keep the total possible score equal to 1000. Although the spreadsheets can accommodate a limited number of "N/As" and blanks, too many of them will obfuscate the meaning of a numerical score and an effort should be made on the part of the assessor to minimize the number of Elements that are not rated. In the case of D-B acquisitions, this may be unavoidable and additional scrutiny of the project's maturity by other means may be warranted. Ratings cells should not be left blank. A blank cell equates to a score of zero. If an assessor does not feel qualified to rate a particular Element, a duly qualified assessor(s) should be assigned so that every applicable Element is scored and included in the review.

2.7 Who Should Perform the EM CDAT and How Long Does it Take?

The CDAT rating needs to be performed by qualified Subject Matter Experts (SMEs) assigned as the Assessors. The CDAT Criteria for each element is written to be sufficient for an SME's use as an Assessor. However, the criteria are not sufficiently detailed to be useable by personnel who are not qualified in that particular element's subject area. Depending on the purpose of the review, the assessor team may consist of the Project Management Team for a given project, or independent review groups that are well-versed in project management concepts, and have a good understanding of the particular project. The Project Management Team usually will be asked to self-assess the project using the EM CDAT.

DOE Order 413.3B requires several types of independent assessments/reviews at most all project phases. The review team leadership responsibility varies depending on the project size and if it is designated as a nuclear facility. For Programs, the Order uses the term "Project Management Support Office (PMSO)." In EM the Office of Project Management (EM-5.22) is the PMSO. Table 2-3 is summarized from DOE Order 413.3B, Appendix A section 4.0. It lists when these reviews/assessments are, as a minimum, required and who is responsible for carrying them out. The EM CDAT tool is designed to be comprehensive in all project management areas and serve as a yardstick to assist in every one of these project assessments/reviews.

Spreadsheets for all three EM project types (Construction, Environmental Restoration, and D&D (Non-CERCLA)) for all four project phases are provided in sections 4.0, 5.0 and 6.0. It is recommended that the assessor use an electronic version of the spreadsheets. These are available for download at:

<https://www.energy.gov/em/downloads/project-assessment-tools>

Table 2-3. Summary of Project Management Review Requirements

Critical Decision	Total Project Cost (TPC in millions)	Management Review Required by DOE O 413.3B	Performing Review
CD-0	$\geq \$750$	Mission Validation Independent Project Review (IPR)	EM-1
	Between \$100 and \$750	<ul style="list-style-type: none"> • Mission Validation Independent Project Review (IPR) at the discretion of the CFO. • Perform a Project Peer Review (PPR) post CD-0 	EM-5.22
CD-1	All Hazard category 1, 2, or 3 projects	<ul style="list-style-type: none"> • IPR • Post CD-1, conduct annual Project Peer Reviews for active projects >\$100M 	EM-5.22 EM-5.22
CD-2	$\geq \$100$	<ul style="list-style-type: none"> • Performance Baseline (PB) External Independent Review (EIR) or EM IPR. • Conduct PDRI (CDAT) analysis 	PM FPD/PM
	<\$100M	PMSO will conduct IPRs to validate the PB for projects with a Total Project Cost (TPC) < \$100M.	EM-5.22
	All Hazard category 1, 2, or 3 projects	Conduct a Technical Independent Project Review (TIPR)	EM-5.22/other EM
CD-3	$\geq \$750$	<ul style="list-style-type: none"> • Perform an EIR or Execution Readiness Review • PM will develop an Independent Cost Estimate. 	PM
	<\$750M	Independent Project Review by PMSO for Non-Major System Projects	EM-5.22
CD-4	None specified	<ul style="list-style-type: none"> • Chief Executive for Project Management (CE) or Project Management Executive (PME) approves CD-4 upon notification from the project team that all project completion criteria defined in the Project Execution Plan (PEP) have been met. • Conduct an Operational Readiness Review (ORR) or Readiness Assessment (RA) for Hazard Category 1, 2, and 3 nuclear facilities or formal assessment of Readiness to Operate for non-nuclear projects. 	Not specified
Note: Other reviews, such as design reviews, safety reviews, performance reviews, etc., are not included in this list. Additional project definition reviews are recommended prior to every Critical Decision application, but are not required by the Order.			

Based on field testing, when the EM CDAT is first used scoring should take approximately eight hours. This includes summarizing the review of all documents that are relevant to the project phase and areas being reviewed. With subsequent use, the time to prepare the rating spreadsheet should take approximately 1-2 hours. For Project Self-assessments, it is up to the Federal Project Director (FPD) whether the spreadsheet will be filled out by a team effort or by individuals that is then integrated to provide the self-assessment. When applying CDAT during a PPR or IPR EM-5.22 will prepare their own spreadsheets.

3.0 APPLICABILITY AND USE OF THE EM CAT

This section discusses the applicability of the EM CDAT, and describes how EM intends to use the EM CDAT to improve its project management. Specifically discussed are:

- 3.1 Types of EM Projects for which the EM CDAT is developed
- 3.2 Critical Decisions (CDs)
- 3.3 EM-5.22 Independent Project Reviews (IPRs), Field Office Assessments and Contractor Self-Assessment Reviews
- 3.4 PM Requirements and External Independent Reviews (EIRs)

3.1 Types of EM Projects for which the EM CDAT is developed

The CDAT project assessment tool pertains only to EM Capital Asset Projects. DOE Order 413.3B definitions for “Capital Asset” and “Project” are summarized in Table 3-1. This table also contains descriptions of EM’s three project types. The CDAT assessment criteria are tailored for each of these three EM project types. Explanations for determining which set of CDAT criteria to apply is shown in Table 3-2.

Table 3-1. Capital Asset and Project Definitions

DOE Order 413.3B Definitions
<p>Capital Assets: Capital assets are land, structures, equipment and intellectual property, which are used by the Federal Government and have an estimated useful life of two years or more. Capital assets exclude items acquired for resale in the ordinary course of operations or held for the purpose of physical consumption such as operating materials and supplies. Capital assets may be acquired in different ways: through purchase, construction, or manufacture; through a lease-purchase or other capital lease, regardless of whether title has passed to the Federal Government; or through exchange. Capital assets include the environmental remediation of land to make it useful, leasehold improvements and land rights; assets owned by the Federal Government but located in a foreign country or held by others (such as federal contractors, state and local governments, or colleges and universities); and assets whose ownership is shared by the Federal Government with other entities.</p>
<p>Project: A unique effort having defined start and end points undertaken to create a product, facility, or system. Built on interdependent activities planned to meet a common objective, a project focuses on attaining or completing a deliverable within a predetermined cost, schedule and technical scope baseline. Projects include planning and execution of construction, assembly, renovation, modification, environmental restoration, decontamination and decommissioning, large capital equipment, and technology development activities. A project is not constrained to any specific element of the budget structure (e.g., operating expense).</p>

EM Projects

EM Line Item Construction Projects: Like those constructed by other DOE programs, EM line item construction projects largely conform to the provisions and definition of Capital Asset Projects, as defined in DOE Order 413.3B.

EM Environmental Restoration Capital Asset Projects: The EM Clean-Up program, including studies, operations, remedial actions, deactivation, decommissioning, and surveillance and maintenance are all entirely funded through operations-expense type budget accounts. However, certain cleanup work, including most remedial actions and D&D/demolition are designated as “capital asset projects”. This cleanup work is carried out under CERCLA and/or RCRA regulatory authority. The CDAT Environmental Restoration tool is specifically designed to assist in the assessment of these types of projects. Its use includes D&D cleanup being performed under CERCLA and it can be used for both interim as well as final remedial actions. Due to the nature of the work, EM and all other U.S. clean-up projects follow much different phases and processes than the facility construction Critical Decision process, developed for normal construction projects. Because Environmental Restoration projects use the six-phase CERCLA cleanup process, the CDAT Environmental Restoration tool uses three equivalency bands or ranges instead that approximate the construction-related Critical Decisions. They are: (CD-0 /~1), (CD-1/2), (CD-2/3). These three bands do approximate reasonably well to the conventional construction critical decisions.

EM Non-CERCLA D&D Capital Asset Projects: This category includes D&D capital asset projects that are not conducted under CERCLA regulations but are instead regulated by other authorities, such as a Nuclear Regulatory Commission Decommissioning Plan or by use of DOE’s authority granted under the AEC ACT of 1951 and regulated via DOE Orders. The EM D&D CDAT tool is designed specifically for these types of capital asset projects. Similar to the Environmental Restoration CDAT tool, the non-CERCLA D&D cleanup process does not match up well to the normal construction critical decisions; so this tool also uses the same three equivalency bands/ranges instead. (CD-0 /~1), (CD-1/2), (CD-2/3). These three bands approximate reasonably well to the conventional construction critical decisions.

Although some remain the same, in many cases the EM CDAT has different Elements appropriate to each of the three types of EM projects: Construction, Environmental Restoration, and D&D/Disposition. In general, Elements are designed so as to recognize inherent differences (e.g., piping and instrumentation design diagrams necessary for most construction projects would not be applicable for a project consisting of soil and groundwater environmental restoration work). Similarly, unique regulatory requirements inherent to CERCLA/RCRA cleanup projects are not included in the conventional construction, or non-CECLA D&D CDAT tool sets.

Table 3-2. Criteria for Selecting the Appropriate CDAT Spreadsheet

Criteria Summary
<ul style="list-style-type: none"> ▪ Select the “Construction Projects” CDAT spreadsheet for all of those projects that have the design and construction of a physical capital asset as their major undertaking. ▪ Select the “Environmental Restoration” CDAT spreadsheet for all of those projects that are comprised of environmental restoration work, including D&D work that is performed under CERCLA regulatory authority, as the major component of the work. ▪ Select the EM ”D&D” CDAT for projects where D&D is being performed but is not being accomplished utilizing CERCLA regulations. ▪ If needed, more than one CDAT spreadsheet may be appropriate to use with identifiably separate aspects of a single “project”, in which case, as in the above examples, the project may be broken into two or more components and the CDAT spreadsheet that is most appropriate for each should be applied.

In some instances, an Environmental Restoration Clean-Up Project may have a sub-project that is actually a Construction Project. In such instances, this sub-project should be assessed using the EM CDAT for Construction Projects.

3.2 Critical Decisions (CDs)

For EM construction projects, EM CDAT scores are directly aligned with each of the CDs as defined in DOE Order 413.3B up to but not including, operations or closure (CD-4). Figure 2-1 shows the CDs for Construction-type EM projects, along with the expected EM CDAT score for each project phase. Environmental Restoration and D&D project phases follow a completely different process which consists of six phases, as defined by the CERCLA/RCRA laws and Regulations. Thus, to somewhat align these cleanup projects with the construction-related CDs, for the ER and D&D CDAT tools three equivalency bands/ranges were developed. These three bands (CD-0/~1, CD-1/2, and CD-2/3) approximately equate to the conventional construction phases and thus the DOE Order 413.3B defined CDs.

As discussed above and shown in detail in section 5.0 and 6.0, the CD points for both types of EM Cleanup projects (i.e., Environmental Restoration and Demolition/Disposition) are comprised of three bands that equate to approximately CD-0/~1, CD-1/2, or CD-2/3 of the CDs described in DOE Order 413.3B. In CERCLA/RCRA terms these three bands equate to: 1. Completion of the Preliminary Assessment/Site Investigation (PA/SI); 2. Completion of the Remedial Investigation/Feasibility Study (RI/FS) or Engineering Evaluation/Cost Analysis (EE/CA) for Interim Actions); and 3. Completion of the Remedial Design/Detailed D&D planning and readiness to proceed with Remedial Action.

EM does not use the expected EM CDAT scores solely as a “go/no-go” requirement for CD approval, but the scores are an important factor in the decision to proceed to the next project phase. By EM historical practice, projects that are more than 50 points below the expected score for that project phase should have justification for the reduced score at the EMAAB or ESAAB or EMAAB/ESAAB-equivalent briefing. Similarly, any low scores for specific Elements (e.g., Mission Need Statement at CD-0) also should be discussed at the EMAAB/ESAAB. (Note: In those cases where EM-5.22 or another DOE organization is required to conduct an IPR or EIR, in conjunction with validating the CD readiness process, the Review Team scoring is provided to and will also be a significant input into the EMAAB/ESAAB process).

3.3 EM-5.22 Independent Project Reviews (IPRs), Field Office Assessments and contractor Self-Assessment Reviews

EM-5.22 relies heavily on the EM CDAT for performing the IPRs of EM’s various projects, as well as for measuring progress during PPRs. EM-5.22 uses the EM CDAT when the project is in any of the planning phases (e.g., Pre-Conceptual, Conceptual, Preliminary, and Final Design). Both the review and scoring are meant to identify project strengths and weaknesses and to provide recommendations for project improvement. For projects beyond the Final Design phase, in construction or during Remedial Action, EM-5.22 may use checklists or Lines of Inquiry similar to the EM CDAT. However, the EM CDAT is not designed to be applied per-se after the project has achieved CD-3. When EM-5.22 IPRs are used in conjunction with CD-0 through CD-3 IPR reviews, the EM CDAT scoring is seen as important input to the EMAAB/ESAAB process. CDAT/PDRI scoring is mandated by DOE Order 413.3B as a prerequisite prior to reaching the CD-2 level of maturity. It is an important tool to be used by EM in all cases where an applicable project is reviewed. Therefore, it should be used for independent reviews and self-assessments conducted at each CD prior to CD-4.

Prior to an IPR, it is expected that the EM field office Project Team will perform a self-assessment using the EM CDAT methodology as outlined in Section 2.0. The results from the self-assessment should be transmitted to the Review Team one week before any independent review is scheduled to begin. This will allow the Review Team to study the self-assessment, request any clarifying information, and adjust the supplemental lines of inquiry, as required. Regardless of whether an independent review will be performed or not, it is recommended that the Project Team perform a self-assessment at every CD, periodically to measure progress, or whenever the project is re-baselined.

The spreadsheets are shown in Sections 4.0, 5.0 and 5.0 and Appendix A. It is recommended that electronic versions be used to minimize the possibility of manual calculation errors. These Excel-based spreadsheets can be downloaded from the EM Project Resources section of the EM website and modified to suit the particular project. Typical modifications include: eliminating the columns for inapplicable CD levels that are not pertinent to this review, and adding columns for reviewer assignments, scoring, and comments. The web address where CDAT Scoring Sheets are available for download is:

<https://www.energy.gov/em/downloads/project-assessment-tools>

The site Project Team will choose the applicable EM CDAT spreadsheet to use depending on the project type (Construction, Environmental Restoration or D&D/Disposition). These are editable spreadsheets and can be modified to show only the phase (CD-0 through CD-3) of the project being reviewed and to provide columns for multiple assessments, individual reviewer element assignments, etc. EM-5.22 is also available to assist with this spreadsheet customization process as needed.

4.0 EM CDAT ELEMENTS/DEFINITIONS FOR CONSTRUCTION PROJECTS

Table 4-1

2018 EM Conventional Construction Project Critical Decision Assessment Tool (CDAT)											
Critical Decision Assessment Tool - Traditional Construction Projects (Nuclear, Non-Nuclear), Target Scores by Project Phase											
		Weighting Designation	Weighting Factor	Pre-Conceptual (CD-0)		Conceptual Design (CD-1)		Preliminary Design Performance Baseline (CD-2)		Final Design (CD-3)	
				Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score
A. COST											
A1	Cost Estimate	H	7.5	1	7.5	2	15	5	37.5	5	37.5
A2	Cost Risk/Contingency Analysis	P	3	1	3	2	6	5	15	5	15
A3	Funding Requirements/Profile	H	7.5	1	7.5	2	15	4	30	5	37.5
A4	Independent Cost/Schedule Review	P	3	N/A	0	2	6	5	15	5	15
A5	Life Cycle Cost	P	3	1	3	2	6	4	12	5	15
A6	Forecast Cost at Completion	P	3	N/A	0	N/A	0	3	9	5	15
A7	Cost Estimate for Next Phase Work Scope	P	3	5	15	5	15	5	15	5	15
Subtotal Cost Element					36		63		134		150
B. SCHEDULE											
B1	Project Schedule	H	7.5	1	7.5	2	15	5	37.5	5	37.5
B2	Major Milestones	P	3	1	3	2	6	5	15	5	15
B3	Resource Loading	P	3	1	3	1	3	4	12	5	15
B4	Critical Path Management	H	7.5	1	7.5	1	7.5	4	30	5	37.5
B5	Schedule Risk/Contingency Analysis	P	3	1	3	1	3	5	15	5	15
B6	Forecast of Schedule at Completion	P	3	1	3	1	3	5	15	5	15
B7	Schedule for Next Phase Work Scope	P	3	5	15	5	15	5	15	5	15
Subtotal Schedule Element					42		53		140		150

2018 EM Conventional Construction Project Critical Decision Assessment Tool (CDAT)											
Critical Decision Assessment Tool - Traditional Construction Projects (Nuclear, Non-Nuclear), Target Scores by Project Phase											
				Pre-Conceptual (CD-0)		Conceptual Design (CD-1)		Preliminary Design Performance Baseline (CD-2)		Final Design (CD-3)	
				Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score
C. SCOPE/TECHNICAL											
C1	Systems Engineering/System Design Descriptions	H	3.2	3	9.5	4	12.7	5	15.9	5	15.9
C2	Alternative Analysis	H	3.2	5	15.9	5	15.9	5	15.9	5	15.9
C3	Functional and Operational Requirements	H	3.2	2	6.4	4	12.7	5	15.9	5	15.9
C4	Design Basis (How)	H	3.2	2	6.4	4	12.7	5	15.9	5	15.9
C5	Design Criteria/Design Margins (How to)	P	1.5	1	1.5	4	5.8	5	7.3	5	7.3
C6	Technology Needs Identified	P	1.5	3	4.4	5	7.3	5	7.3	5	7.3
C7	Technology Needs Demonstrated	H	3.2	2	6.4	4	12.7	5	15.9	5	15.9
C8	Trade-Off Optimization Studies	P	1.5	1	1.5	3	4.4	5	7.3	5	7.3
C9	Site Location	P	1.5	3	4.4	4	5.8	5	7.3	5	7.3
C10	Plot Plan	P	1.5	2	2.9	4	5.8	5	7.3	5	7.3
C11	Process Flow Diagrams (PFDs)	P	1.5	N/A	0.0	3	4.4	4	5.8	5	7.3
C12	Natural Phenomena	P	1.5	2	2.9	3	4.4	5	7.3	5	7.3
C13	Layout Drawings and Equipment List	P	1.5	N/A	0.0	3	4.4	4	5.8	5	7.3
C14	Piping & Instrumentation Diagrams (P&ID)	H	3.2	N/A	0.0	3	9.5	4	12.7	5	15.9
C15	Mechanical (Piping)	P	1.5	N/A	0.0	1	1.5	2	2.9	5	7.3

2018 EM Conventional Construction Project Critical Decision Assessment Tool (CDAT)											
Critical Decision Assessment Tool - Traditional Construction Projects (Nuclear, Non-Nuclear), Target Scores by Project Phase											
		Weighting Designation	Weighting Factor	Pre-Conceptual (CD-0)		Conceptual Design (CD-1)		Preliminary Design Performance Baseline (CD-2)		Final Design (CD-3)	
				Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score
C16	Instrument & Electrical	P	1.5	N/A	0.0	1	1.5	2	2.9	5	7.3
C17	Site Characterization (Including Surveys & Soil Tests)	P	1.5	1	1.5	3	4.4	5	7.3	5	7.3
C18	Waste Characterization and Disposition	H	3.2	1	3.2	3	9.5	5	15.9	5	15.9
C19	Pollution Prevention & Waste Minimization	P	1.5	2	2.9	3	4.4	4	5.8	5	7.3
C20	Waste Storage, Packaging and Transportation	H	3.2	2	6.4	3	9.5	5	15.9	5	15.9
C21	NEPA Documentation	H	3.2	2	6.4	4	12.7	5	15.9	5	15.9
C22	Long Lead/Critical Equipment & Material List	P	1.5	1	1.5	3	4.4	4	5.8	5	7.3
C23	Design Completion	P	1.5	N/A	0.0	1	1.5	2	2.9	5	7.3
C24	Design Reviews	P	1.5	N/A	0.0	5	7.3	5	7.3	5	7.3
C25	Interface Planning and Control	P	1.5	1	1.5	3	4.4	4	5.8	5	7.3
C26	Operating, Maintenance & Reliability (OMR) Concepts	P	1.5	2	2.9	4	5.8	5	7.3	5	7.3
C27	Safeguards and Security	P	1.5	1	1.5	3	4.4	4	5.8	5	7.3
C28	Heat and Material Balances	P	1.5	N/A	0.0	3	4.4	5	7.3	5	7.3
C29	Reliability, Availability, Maintainability & Inspectability (RAMI) Analysis	P	1.5	N/A	0.0	3	4.4	4	5.8	5	7.3
C30	Materials Loading/Unloading/Staging	P	1.5	1	1.5	2	2.9	4	5.8	5	7.3
C31	Constructability and Construction Planning	H	3.2	N/A	0.0	2	6.4	4	12.7	5	15.9
C32	Sustainable Design	P	1.5	1	1.5	3	4.4	5	7.3	5	7.3
C33	Transition and Startup Planning	H	3.2	N/A	0.0	3	9.5	4	12.7	5	15.9
C34	Operations Plans and Procedures	P	1.5	N/A	0.0	1	1.5	3	4.4	5	7.3
C35	Civil, Structural and Architectural	P	1.5	1	1.5	2	2.9	3	4.4	5	7.3
Subtotal Scope/Technical Element					94		226		310		350

2018 EM Conventional Construction Project Critical Decision Assessment Tool (CDAT)											
Critical Decision Assessment Tool - Traditional Construction Projects (Nuclear, Non-Nuclear), Target Scores by Project Phase											
				Pre-Conceptual (CD-0)		Conceptual Design (CD-1)		Preliminary Design Performance Baseline (CD-2)		Final Design (CD-3)	
				Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score
D. MANAGEMENT PLANNING AND CONTROL											
D1	Mission Need Statement	H	2.2	5	11.1	5	11.1	5	11.1	5	11.1
D2	Acquisition Strategy Plan	H	2.2	3	6.7	5	11.1	5	11.1	5	11.1
D3	Key Project Assumptions	P	1.7	3	5.0	4	6.7	5	8.3	5	8.3
D4	Project Execution Plan (PEP)	H	2.2	1	2.2	3	6.7	5	11.1	5	11.1
D5	Integrated Project Team (IPT) and Charter	P	1.7	2	3.3	3	5.0	5	8.3	5	8.3
D6	Conceptual Design Report (CDR)	H	2.2	N/A	0.0	5	11.1	5	11.1	5	11.1
D7	Baseline Change Control	H	2.2	1	2.2	4	8.9	5	11.1	5	11.1
D8	Project Control	P	1.7	N/A	0.0	3	5.0	5	8.3	5	8.3
D9	Project Work Breakdown Structure (WBS)	P	1.7	1	1.7	4	6.7	5	8.3	5	8.3
D10	Resources Required (People/Material) for Next Phase	P	1.7	5	8.3	5	8.3	5	8.3	5	8.3
D11	Configuration Management	H	2.2	1	2.2	3	6.7	5	11.1	5	11.1
D12	Project Risk Management Plan/Assessment	H	2.2	2	4.4	3	6.7	5	11.1	5	11.1
D13	Quality Assurance Program	H	2.2	1	2.2	4	8.9	5	11.1	5	11.1
D14	Value Engineering	P	1.7	1	1.7	3	5.0	5	8.3	5	8.3
D15	Procurement Packages	P	1.7	N/A	0.0	1	1.7	2	3.3	5	8.3
D16	Project Acquisition Process	P	1.7	5	8.3	5	8.3	5	8.3	5	8.3
D17	Integrated Regulatory Oversight Program	P	1.7	2	3.3	4	6.7	5	8.3	5	8.3
D18	Inter-Site and On-Site Coordination	P	1.7	2	3.3	3	5.0	5	8.3	5	8.3
D19	Stakeholder Program	H	2.2	2	4.4	4	8.9	5	11.1	5	11.1
D20	Funds Management	P	1.7	5	8.3	5	8.3	5	8.3	5	8.3
D21	Reviews/Assessments	P	1.7	5	8.3	5	8.3	5	8.3	5	8.3
	Subtotal Management Planning and Control Element				87		155		195		200

2018 EM Conventional Construction Project Critical Decision Assessment Tool (CDAT)											
Critical Decision Assessment Tool - Traditional Construction Projects (Nuclear, Non-Nuclear), Target Scores by Project Phase											
		Weighting Designation	Weighting Factor	Pre-Conceptual (CD-0)		Conceptual Design (CD-1)		Preliminary Design Performance Baseline (CD-2)		Final Design (CD-3)	
				Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score	Maturity Value	Target Score
E. SAFETY											
E1	Hazard Analysis/Safety Documentation	P	5	2	10	4	20	5	25	5	25
E2	Integrated Safeguards and Security Planning	P	5	1	5	4	20	4	20	5	25
E3	ES&H Management Planning (Including ISM)	H	15	2	30	4	60	4	60	5	75
E4	Emergency Preparedness	P	5	1	5	2	10	4	20	5	25
Subtotal Safety Element					50		110		125		150
			TOTAL		309		607		903		1000

EM Project Critical Decision Assessment Tool - Construction Project Definitions

The following definitions describe the criteria required to achieve a maximum rating or maturity value of 5. It should be assumed that maturity values of 0-5 represent a subjective assessment of the quality of definition and/or the degree to which the end-state or maximum criteria have been met, or the product has been completed in accordance with the definition of maturity values.

Table 4-2

2018 EM CDAT Construction Project Definitions and Target Score Criteria

The following definitions describe the criteria required to achieve a maximum rating or maturity value of 5. It should be assumed that maturity values of 0-5 represent a subjective assessment of the quality of definition and/or the degree to which the end-state or maximum criteria have been met, or the product has been completed in accordance with the definition of maturity values.

Criteria for Maximum Rating

A. COST					
A1	Cost Estimate	A cost estimate has been developed and formally approved by FPD and is the basis for the cost baselines. The cost estimate is a reasonable approximation of Total Project Costs (TPCs), and covers all phases of the project. The estimate is prepared in accordance with DOE requirements. The estimate bases are fully documented and traceable. Supporting backup information has been collected and organized and is available in a central file or location. Major estimate assumptions, especially those affecting major cost drivers, are fully documented and explained. Estimate exclusions or qualifications are clearly documented. Estimated costs are time-phased and escalated using current DOE or other justifiable escalation rates. For cost estimate point values AACEI Cost Recommended Practice 17R-97 is a useful reference. A Class I (CDAT score of 5) estimate is developed from quantity take offs from completed design plans and specifications. Whereas the Class 5 estimate (CDAT score 1) is of a rough order of magnitude estimate useful for determining the range of costs for various alternatives at CD-0.			
		Project Phase (DOE O 413.3B)	Level of Project Definition	Estimate Class	CDAT Maturity Value
		CD-0/Approve Mission Need	0% to 15%	Class 4/5	1
		CD-1/Approve Alternative Selection & Cost Range	10% to 15%	Class 3	2
		CD-2/Approve	30% to 70%	Class 2	3-4
		CD-3/Approve Start of Construction	50% to 100%	Class 1	5

		Criteria for Maximum Rating		
A2	Cost Risk/Contingency Analysis	The cost estimate includes contingency allowances developed in accordance with DOE guidance. In addition to any deterministic contingency analyses that may have been developed, a probabilistic risk analysis has been performed. The assumptions, rationale and methodology used to perform the probabilistic analysis are explained. The cost risk analysis builds on and is tied to the Project Risk Management Plan. Risk mitigation costs, if appropriate, have been included in the baseline cost estimate, or addressed by the risk analysis model. Costs related to schedule contingency also are included. The use of management reserve by contractors in procurement actions has been evaluated. The confidence level of the baseline cost estimate is clearly stated and explained. All of the preceding requirements are documented in the project record.		
A3	Funding Requirements/Profile	Funding requirements have been defined and the project timeline is in compliance with the DOE budget timeline/process. Required budget documentation, including Project Data Sheets (where required), reflects current project cost and schedule estimates/forecasts. The funding profile is based on quantified resource requirements derived from the cost estimate, time-phased through integration with the project baseline schedule. Resource constraints (personnel, budget authorizations, etc.) have been considered when developing the project schedule, and an iterative process used to correlate the cost estimate, schedule and funding profile. The funding profile is based on full consideration of available or expected budget or funding levels for the project. The impact of any projected funding shortfalls has been assessed and management strategies developed to accommodate those shortfalls have been considered and incorporated in the project plans. All of the preceding requirements are documented in the project record.		
A4	Independent Cost/Schedule Review	In addition to any internal cost and schedule estimate reviews, the cost estimate and schedule have been subjected to an independent review by an organization not directly involved with the project (Independent Cost Estimate, when required). The independent review has been documented, including the techniques used and type of review performed. The results, findings and recommendations of the independent review have been reconciled with the cost and schedule estimates and changes have been incorporated.		
A5	Life Cycle Cost	The project Life Cycle Costs (LCC) includes relevant assumptions, bases of estimate, qualifications, and exclusions. LCC includes the estimated cost for government commitments that result from execution of this project, including downstream projects/facilities and eventual disposition of the facilities constructed for this project. The LCC estimate should meet the requirements of Office of Management and Budget directives and DOE Orders and guidance. LCC of competing projects or alternative strategies are estimated and documented on a comparable basis. For nuclear projects, or other projects with significant safety hazards, accidents mitigation costs associated with structures, systems, and components (SSCs) have been included. For high hazard facilities, safety mitigation costs are often a key discriminator in competing projects or alternatives.		

A6	Forecast of Cost at Completion	The cost baseline is approved and the measurement of actual performance is begun, forecasts of costs at completion (actual costs to-date plus “to-go” costs) are developed and issued at regular intervals. Cost forecasts are developed in accordance with project procedures. Key assumptions supporting the baseline estimate are documented and periodically re-evaluated and the impacts of changing assumptions are reflected in the estimates of “to-go” costs. Forecasts are related to the Change Control system and incorporate both approved and pending changes, as appropriate. The forecast of cost at completion is a reasonable projection based on the status of the project and experience to-date.
A7	Cost Estimate for Next Phase of Work	A detailed cost estimate is prepared and approved for the work scope to be accomplished during the next phase of the project (i.e., the efforts needed to successfully complete the prerequisites for the next Critical Decision). Cost estimates are defensible with an appropriate level of supporting detail and documentation. Assumptions are clearly documented and stated.
B. SCHEDULE		
Criteria for Maximum Rating		
B1	Project Schedule	A schedule has been developed, documented and approved by DOE, is identified in regulatory milestones, and is the basis for the Schedule Baseline. The schedule is a reasonable layout of project activities for all phases of the project and is at a level of development that will allow project execution. Included project activities are consistent with the Work Breakdown Structure (WBS), and the schedule is prepared in accordance with DOE guidance and practices. The schedule is activity-based and includes milestones, reasonable durations and acceptable logic. Schedules and milestones should align after negotiations and change packages are complete. Lower level schedules are developed and tiered to support the baseline schedule and/or Project Master Schedule. Project-specific conditions are included. Assumptions are defined. Interface requirements (including technology development and Government Furnished Services and Items (GFSI) are incorporated into the schedule. The baseline schedule covers the full scope of the project through CD-4, including the startup and transition to operations phases. An appropriate method of developing the schedule is used, including an acceptable software package such as P-3, when applicable. The project schedule has undergone an independent documented check for completeness and accuracy.
B2	Major Milestones	Milestones are included at each level of the project schedule to establish a baseline and indicate significant progress against the work to be completed. Stakeholder and regulatory milestones are included, as appropriate. Milestones are tiered to support project decisions, performance, approvals, etc. A milestone dictionary is provided which defines the requirements for successful completion. An appropriate number of milestones are included to control the project.
B3	Resource Loading	The schedule is resource loaded, considers critical resources, and is consistent with the funding profile. The resource loading is documented, and is reasonable, considering such elements as ramp-up, lead times, constraints, etc.
B4	Critical Path Management	A Critical Path is defined. Near-Critical Path activities are identified and sensitivity analyses have been conducted. Schedule management practices are properly focused on Critical Path and Near-Critical Path activities.

B5	Schedule Risk/Contingency Analysis	A probabilistic risk assessment has been conducted on the baseline schedule, and appropriate contingency added, as required. Assumptions, rationale, and methodology, used in the analysis are documented. Schedule risks are fully integrated with the risk management plan.
B6	Forecast of Schedule Completion	The schedule baseline is approved and the measurement of actual performance has begun, forecasts of completion dates are developed and issued at regular intervals in addition to presentations of schedule progress. Schedule forecasts reflect actual performance, to date, and projections. Forecasts are related to the Change Control system and incorporate both approved and pending changes.
B7	Schedule for Next Phase of Work	A detailed schedule is approved for activities to be accomplished during the next phase of the project (i.e., the efforts needed to successfully complete the prerequisites for the next Critical Decision). The schedule is defensible with an appropriate level of supporting detail and documentation.
C. SCOPE/TECHNICAL		Criteria for Maximum Rating
C1	Systems Engineering /System Design Descriptions	<p>Systems engineering is used to transform mission operational requirements or remediation requirements into system architecture, performance parameters, and design details. Beginning with the definition of a need, the systems engineering process is viewed as a hierarchy that progresses through a baseline and ends with verification that the need is met, including interfaces, fit, and completeness. The application of systems engineering to a project is tailored to the project's needs and documented. System Design Descriptions (SDD) have been prepared and kept updated to include flow-down of safety and non-safety requirements, and design features shown on design drawings, including safety functions and waste streams/interfaces. SDDs identify the analysis and tests which demonstrate that the design satisfies requirements and performance criteria. Flow charts of major systems have been mapped. Monitoring and surveillance have been established to track successful execution. Related systems are successfully integrated. Appropriate safety considerations have been applied on a system-wide basis.</p> <p>These activities should be conducted in accordance with DOE's expectations for incorporating safety into the design process as prescribed in DOE STD 1189-2008, Integration of Safety into the Design Process; and DOE O 420.1B, Facility Safety, as they may apply and appropriate. An independent review has been conducted by a team with appropriate experience and engineering disciplines. Comments have been documented, as well as actions taken for disposition of the comments.</p>

C2	Alternatives Analysis	A subset of reasonable project alternatives/viable alternatives has been determined by means of a documented screening analysis. Major alternatives have been identified and viable alternatives have been analyzed. Alternative Analysis includes comparisons of LCC, Feasibility (including Technology Development requirements), Stakeholder Values, Safety, Regulatory Compliance, constructability and other factors, as appropriate. Life-cycle costs should include costs for structures, systems and components (SSCs) needed to mitigate hazards, as well as life-cycle costs associated with operations and maintenance of the SSCs. The preferred option(s) is identified and justified. The overall condition and status of the facility at project completion (end state) is defined. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and are appropriate.
C3	Functional and Operational Requirements (F&ORs)	<p>Within Project Management, F&ORs translate program requirements into design products at the early stages of project development. Project technical requirements are translated from the mission need statement, to program requirements, to F&ORs, to design criteria, and finally documented in Facility/System Design Descriptions. The F&OR will describe the processes and systems that should be included in a project to meet program requirements and fulfill program capabilities articulated in the program mission statement.</p> <p>To contrast to an F&OR in project management, in safety basis, functional requirements define design requirements necessary to support the safety functions associated with Safety Class (SC) and Significant Safety (SS)-SSCs, e.g., for example facility structure should meet Performance Criteria (PC)-3 seismic design loads. F&ORs and functional requirements for the project is documented, approved (by users, key stakeholders, and the DOE program office as appropriate) and are under configuration control. The process should be part of the safety in design activities as defined by DOE STD1189-2008, as they may apply and as appropriate.</p>
C4	Design Basis (How)	The set of requirements that bound the design of systems, structures and components within the facility. These design requirements include consideration of safety, plant availability, efficiency, reliability, and maintainability. Project design basis is developed and reviewed including appropriate level of approval from users, key stakeholders, site management, and DOE. Design Basis has clearly defined key performance expectations and provided a sound framework for subsequent design activities, including the regulatory context. Design basis has been peer reviewed by appropriate technical experts. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.

C5	Design Criteria/Design Margins (How to)	<p>Design Criteria have been clearly defined and quantified including the specification of applicable codes and standards. Design Margins for all structures, systems and components must also be specified. The facility (including safety class and safety significant SSCs) Safety Design Criteria [e.g. DOE O 420.1(b)] have been clearly defined and quantified. Margins for safety design criteria must also be specified.</p> <p>Design criteria for worker safety, security and safeguards have been clearly defined, including the Design Criteria that address the Design Basis Threat. Design Criteria must address both Material Control and Accountability. Design Margins must also be addressed.</p> <p>Requirements and guidelines that govern design of the project have been reviewed by users and appropriate discipline experts and the criteria have been approved. Design margins to cover contingency in the design itself have been reviewed and approved, and placed under configuration control. Criteria include items such as: 1. Regulations, 2. DOE Orders, 3. Codes and Standards (Federal, State and local), 4. Engineering Standards (DOE and contractor); functional performance.</p> <p>These activities should be conducted in accordance with DOE's expectations for incorporating safety into the design process as prescribed in DOE STD 1189-2008, Integration of Safety into the Design Process; and DOE O 420.1B, Facility Safety, as they may apply and as appropriate.</p>
C6	Technology Needs Identified	<p>Availability of new technology for the project is established, the technology has been evaluated, including benefits and risks. Technology development requirements for each alternative are documented. Deployment of a new technology for the project should be part of the project risk assessment and is reflected in the project schedule and cost estimate. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>
C7	Technology Needs Demonstrated	<p>New technology has been tested and determined to meet project objectives (technical, cost and schedule). Maturity of new technology to be used has been evaluated and factored into risk analysis by means of a Technology Readiness Assessment, or its equivalent (Reference: DOE G 413.3-4, <i>Technology Readiness Assessment Guide</i>, dated 10-12-09). An evaluation of the inappropriateness of existing technology has been documented to justify the need. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>
C8	Trade-Off/Optimization Studies	<p>The Trade-Off Studies are performed, as needed, to reach a reasonable level of project risk consistent with project phase and overall project cost/schedule. These trade-off studies are a part of conceptual and later design phases to optimize the design of the selected alternative. The studies include alternative design and process controls, and optimization approaches with consideration of technical safety requirements. The studies conducted should be well documented and the conclusions justified. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>

C9	Site Location	The geographical location of proposed project is defined and approved. The rationale for the decision process is documented, as appropriate. The site selection process is considered a viable option and relative strengths and weaknesses of alternate site locations were assessed. The selection criteria are complete and include major considerations of stakeholders and current operations.																					
C10	Plot Plan	<p>Plot plan is complete and shows location of the project in relation to adjoining facilities. It should include items such as:</p> <table> <tr> <td>§ Grid system with coordinates</td><td>§ Green space coordinates</td><td>§ Buildings</td></tr> <tr> <td>§ Project boundaries</td><td>§ Major pipe racks</td><td>§ Temporary staging areas</td></tr> <tr> <td>§ Gates and fences</td><td>§ Laydown areas</td><td>§ Decontamination areas</td></tr> <tr> <td>§ Off-site facilities</td><td>§ Construction/fabrication areas</td><td>§ Rail facilities</td></tr> <tr> <td>§ Tank farms</td><td></td><td></td></tr> <tr> <td>§ Major utilities</td><td>§ Roads and access ways</td><td>§ Nearby residences</td></tr> <tr> <td>§ Surface water</td><td></td><td></td></tr> </table>	§ Grid system with coordinates	§ Green space coordinates	§ Buildings	§ Project boundaries	§ Major pipe racks	§ Temporary staging areas	§ Gates and fences	§ Laydown areas	§ Decontamination areas	§ Off-site facilities	§ Construction/fabrication areas	§ Rail facilities	§ Tank farms			§ Major utilities	§ Roads and access ways	§ Nearby residences	§ Surface water		
§ Grid system with coordinates	§ Green space coordinates	§ Buildings																					
§ Project boundaries	§ Major pipe racks	§ Temporary staging areas																					
§ Gates and fences	§ Laydown areas	§ Decontamination areas																					
§ Off-site facilities	§ Construction/fabrication areas	§ Rail facilities																					
§ Tank farms																							
§ Major utilities	§ Roads and access ways	§ Nearby residences																					
§ Surface water																							
C11	Process Flow Diagrams (PFDs)	<p>All major systems have associated process flow diagrams showing the entire process, from beginning to end, including raw materials and waste products. Process flow diagrams are complete and annotated with material balances for design basis. Drawings include items such as:</p> <p>System Major equipment items and major system components System Flow of materials to and from the major equipment items</p> <p>- Inter-relationship of all systems and system elements</p> <p>PFDs reviewed, approved and issued with at least Rev. 0 statuses - as an engineering control document. Any changes to process flow diagrams identified during final design effort are reflected in revised drawings. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and appropriate.</p>																					
C12	Natural Phenomena	Architectural, civil/structural, seismic and other natural phenomena design plans and specifications are in compliance with established standards of practice and are documented. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.																					

C13	Layout Drawings and Equipment List	All engineered equipment and/or materials are fully specified, bid, and tabulated, as necessary, to support the project schedule. Long-lead items has been identified and documented with supporting technical basis. Equipment having safety functions is identified with appropriate quality levels. Drawings are comprehensive, reasonable, and show all major elements in a logical format. Individual drawings for major systems are shown in consistent orientation and scale. Layout and major equipment location/arrangement drawings that identify locations of each item of equipment are complete and finalized. All appropriate parties affected by equipment placement (operations, maintenance, etc.) have had the opportunity to provide input and have reviewed the layout. The facility, systems and major component equipment list is complete. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
C14	Piping & Instrumentation Diagrams (P&ID)	The final version of revised P&IDs is available. The P&ID have been issued as a configuration control document. P&IDs include all changes identified from the preliminary hazard analysis (PHA), and the maintenance and operations review. The diagrams show piping, valves with tag numbers, piping tie-ins to existing lines, discharge and monitoring points, utilities and storage tanks/sumps. Comprehensive reviews are complete and results incorporated. Examples of these reviews include (but are not limited to), Safety Analysis Reports, maintenance and operations requirements, and final construction and fabrication detail reviews. The P&ID drawings have been independently reviewed and approved. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
C15	Mechanical (Piping)	<p>Process/mechanical design plans and specifications are approved and issued for construction, as appropriate, include:</p> <ul style="list-style-type: none"> ▪ Mechanical Design ▪ Mechanical Equipment List ▪ Piping Specialty Items List ▪ Piping system criteria ▪ Valve List with tag numbers ▪ Tie-in List for all piping tie-ins to existing lines ▪ Piping stress analysis ▪ Specifications (design, performance, manufacturing, material, and code requirements) ▪ Utility flow diagrams ▪ Utility Sources with supply conditions <p>The plans and specifications have been independently reviewed and approved and placed under configuration control. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>

C16	Instrument and Electrical	<p>The National Electrical Code and state and local relevant codes are incorporated into the design and project plans. Safety and security components have appropriate designations and separation criteria have been considered in their design. Instrument and Electrical requirements, as appropriate, including the following, are approved and issued for construction:</p> <ul style="list-style-type: none"> ▪ Electrical Area Classifications ▪ Substation Requirements ▪ Electrical Design Requirements ▪ Electrical One-Line Diagrams ▪ Utility flow diagrams ▪ Instrument Set Point document ▪ Substation Design ▪ Instrument Index ▪ Logic Diagrams ▪ Instrument and Electrical Specifications ▪ Utility sources with supply conditions <p>The plans and specifications have been independently reviewed and approved and placed under configuration control. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>
C17	Physical Site Characteristics	<p>Assessments of site-specific attributes are complete. Survey and geotechnical evaluations of the proposed site are complete. Investigation and development of site-specific characteristics are sufficient to support final Natural Phenomena Hazard design basis and key assumptions are clearly documented. Remediation plan to address identified site characterization deficiencies has been developed, if appropriate. Areas of potential risk are identified. Evaluation and results of the investigation characterize the following:</p> <ul style="list-style-type: none"> ▪ Hydrology ▪ Geology ▪ Seismic ▪ Underground obstructions and utilities ▪ Environmental contamination ▪ Geotechnical attributes <p>The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>
C18	Waste Characterization and Disposition	<p>Waste streams generated (gaseous, solid, and liquid, both hazardous and non-hazardous) through construction, demolition, or building preparations are sufficiently characterized to identify appropriate disposition alternatives and worker protection levels and documented in a Waste Management Plan. Samples have been collected, analyzed and validated to produce reliable, high quality data. Necessary plans and actions have been taken to confirm conditions, prepare documents and perform the discovery action, including resolving surveillance and monitoring activities and safety considerations. Historical data and process knowledge are fully documented. All waste streams have their disposition finalized and included in the project costs, risks and schedule. The on-site or off-site Waste Acceptance Criteria are documented, approved, and included in the design requirements for the project.</p>

C19	Pollution Prevention and Waste Minimization	<p>A detailed waste minimization/pollution prevention plan for the project and operational phase is complete. A description, estimated costs, and present implementation plan for design, operation, and mitigation features that will minimize wastes and prevent pollution are approved. A detailed waste management plan describing quantities and types of wastes to be generated and plans for their waste treatment, storage or disposal are complete. The plan should:</p> <ul style="list-style-type: none"> ▪ Support the waste management cost estimate for the process as well as any facilities. Estimated costs considered in Critical Decision process.) ▪ Identify project options for waste treatment, storage, and disposal, including availability of future disposal capacity and sites. ▪ Integrate waste management plans with waste minimization/pollution prevention plans. ▪ Characterize regulatory benefits and concerns associated with types and quantities of wastes expected.
C20	Waste Storage, Packaging and Transportation	<p>Storage, packaging and transportation requirements for nuclear and hazardous materials and wastes are identified and documented, including both off-site and in-plant transportation, as well as methods and equipment (casks, overpacks, etc.) for packaging, receiving/shipping materials (e.g., rail, truck, air, marine). The waste packaging and shipping requirements are identified, documented and included into the project design. Storage areas have required permits. Storage, packaging, and transportation specifications are fully identified for each waste stream.</p>
C21	NEPA Documentation	<p>Major environmental regulations are identified. Potential environmental permitting issues have been identified. Strategy for addressing environmental permitting issues is defined and documented. Environmental permitting authorities have been contacted and briefed on potential releases to the environment, and the project approach to meeting requirements for air emissions, water discharges, land disposal, and disposition of waste streams. Requirements have been defined and incorporated into design criteria for air emissions, wastewater discharges, land disposal of hazardous wastes, and disposition wastes. Structures, systems, and components are designed consistent with approved environmental permitting requirements. All wastes have a path forward for ultimate disposition. Structures, systems and components in the final design drawings are consistent with approved environmental permitting requirements. All NEPA activities, including NEPA strategy and requirements, are complete and compliant with DOE Orders, as necessary.</p>
C22	Long Lead/Critical Equipment & Materials List	<p>The need for long-lead items and critical equipment has been documented. Long-lead items are listed. Procedures for their acquisition, vendors, and impacts on the schedule have been documented. Any necessary R&D prior to ordering, fabrication or installation has been integrated to the project scope, risks, schedule and costs.</p>

C23	Design Completion	Design drawing needed to support construction and system/equipment/component procurements are complete and should include (among others as required): general arrangements and site layout drawings; architectural drawings; structural drawings; mechanical (HVAC, fire protection) drawings; special process equipment design drawings (build to print); piping drawings; electrical drawings; instrumentation and control drawings; process flow diagrams; and arrangements showing the limits of any existing facility demolition. A complete listing of design specifications for structures, systems and components (SSCs) has been developed which contains requirements to construct, procure, fabricate, install and test. Any drawings which are intended to provide specification requirements for SSCs procurements have been identified. Drawings have been checked and reviewed by an independent team with appropriate experience and engineering disciplines. Comments and resolutions have been documented and accepted by reviewers. Back-up files include engineering files, trade-offs, calculations, etc. Safety is integrated into the design. The design authority has signed off on all design drawings. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
C24	Design Reviews	Design reviews have been conducted at each appropriate project phase (at a minimum i.e., Conceptual, Preliminary and Final Design). They have been performed by a multi-functional team representing appropriate disciplines and, if appropriate, external experts have been utilized. Review results, comments and resolutions have been documented and accepted by reviewers. Safety issues have been resolved. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
C25	Interface Planning and Control	System interfaces (consistent with System Design Descriptions) have been identified and defined, and, if necessary, an Interface Control Plan is approved and implemented. All internal and external stakeholders have been involved in project development and planning. Appropriate ties to project logic have been accomplished for each stakeholder (i.e., material receipt, transportation, safeguards and security, safety, worker's health, regulatory, effect on current operations, etc.). The process should be part of the safety in design activities as defined by DOE STD 1189-2008; DOE 440.1B, May 2007, Worker Protection Program for DOE; 10 CFR 851, Worker Safety and Health Program; as they may apply and as appropriate.
C26	Operating, Maintenance, and Reliability (OMR) Concepts	OMR concepts are approved and appropriately documented in the design. Operations personnel are involved with the development of OMR requirements and these requirements have been incorporated/considered in the design development. The process should be part of the safety in design activities as defined by DOE STD 1189-2008; DOE 440.1B, May 2007, Worker Protection Program for DOE; 10 CFR 851, Worker Safety and Health Program; as they may apply and as appropriate.

C27	Safeguards and Security	Major safeguards and security issues were identified and documented in the Mission Needs Statement. An initial security vulnerability assessment and a cyber security plan were prepared for the project. Security system design requirements based on performance requirements of the Graded Security Protection Policy, DOE O 470.3B, have been identified and incorporated into the project. The final security vulnerability assessment report and cyber security plan were approved and placed under configuration control. At the conclusion of the final design, all safeguard and security requirements as required by DOE M 470.4 series directives are satisfied by the facility design and/or proposed operational features.
C28	Heat and Material Balances	The heat and material balance calculations needed to design and size major plant equipment have been completed. All calculations needed to conduct a Hazard Analysis of the Preliminary Design for major equipment and process operations (substantiate the key flow rates in process flow diagrams) have been completed. The heat and balances calculations have been independently reviewed. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
C29	Reliability, Availability, Maintainability and Inspectability (RAMI) Analysis	A high level RAMI analysis is performed for each of the reasonable/viable project alternatives. Design features needed to mitigate impact to workers have been considered and results documented. A RAMI analysis (to include trade-off studies) has been performed to ensure the equipment selected and the design configuration represents the optimal system to meet throughput and other mission requirements at both the high and lower system levels. The RAMI analysis has been reviewed by an independent team with RAMI experience and review comments are documented and disposed with supporting rationale. Results of the RAMI have been incorporated into the technical baseline. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
C30	Materials Loading/Unloading/Staging	There is a complete list of requirements for loading, unloading, and staging of raw materials and products along with their specifications including cranes and remote handling equipment for the installation/removal or operation of process equipment. This list should include such items as: <ul style="list-style-type: none"> ▪ Material Safety Data Sheets created ▪ Instantaneous and overall loading/unloading rates ▪ Details on supply and/or receipt of containers and vessels ▪ Storage facilities to be provide and/or utilized ▪ Specification of any required special isolations provisions ▪ Specification for process handling equipment, including robotics, remote devices and cranes
C31	Constructability and Construction Planning	A constructability assessment has been performed. The assessment of alternatives should consider the technical construction challenges and resources required by various alternatives. The constructability assessment has been documented and independently reviewed. Construction planning has been completed and performed by personnel with construction experience on similar projects and documented as part of the final design review.

C32	Sustainable Design	Leadership in Energy and Environmental Design (LEED) target level (i.e. silver, gold) has been selected and a set of energy efficient and sustainable design features have been identified. Requirements consistent with the selected LEED design features have been incorporated into the design criteria. Final energy efficient design features derived from the LEED target level (i.e. silver, gold) have been identified in the design criteria and the design drawings.
C33	Transition and Startup Planning	<p>Project strategy addresses critical issues for transition from construction/restoration to startup/testing to operations, if appropriate. Project transition strategy is finalized. “Cold Start-Up” and “Hot Start-Up” planning sufficiently complete to include identification of sub-system and system testing required, indicating and recording instrumentation required to monitor and assess test performance, and schedule duration and costs needed to successfully conduct the tests. There is an appropriate start-up plan for transition to operation, including maintenance and inspection schedules, reliability testing and monitoring, and documentation. Resources are appropriately identified and integrated into the project schedule. At a minimum, the following critical issues are addressed:</p> <ul style="list-style-type: none"> ▪ Subsystem/system turnover criteria and documentation ▪ Test acceptance criteria ▪ Turnover (transition) security issues (such as access control and subsystem/system isolation) ▪ Craft jurisdictional issues ▪ Integrated testing plans, etc. ▪ Operational, process engineering, and maintenance personnel readiness for project operations. ▪ Start-up organization established; roles, responsibilities and authority established and defined
C34	Operations Plans and Procedures	<p>Operating plans and procedures are defined and development plans are in place, including operating procedures that reference technical specifications and administrative limits, as necessary. Monitoring and training requirements for operations are in place, if appropriate. Training input and planning is developed. Disposition considerations and training requirements are defined, approved, and incorporated, as appropriate. Simulation and mockup facilities are defined and established, as necessary.</p> <p>If applicable, processing and production plans and schedules are in place and include such items as:</p> <ul style="list-style-type: none"> ▪ All production/characterization/sampling steps are identified and integrated ▪ Assumed throughput and production efficiencies are defined and reasonable ▪ Assumptions are supported by time and motion studies, calculations and operating experience ▪ Resource requirements for each step identified ▪ Failure/reject rate assumptions documented and supported ▪ Equipment and material needs including availability and reliability defined ▪ Initial production plan formulated ▪ Design approach has optimized processing and production objectives considering spare capacity

C35	Civil, Structural and Architectural	Architectural, civil/structural requirements; seismic and other natural phenomena design requirements are fully documented. Civil/Structural design plans and specifications are approved and issued for construction. The plans and specifications have been independently reviewed and approved and placed under configuration control. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, and are applied as appropriate.
D. MANAGEMENT PLANNING AND CONTROL		Criteria for Maximum Rating
D1	Mission Need Statement (MNS)	An approved Mission Need Statement exists. The project MNS demonstrates that the project relates to and supports execution of Program Strategic Plan goals and objectives as well as the DOE Strategic Plan. A MNS describes shortfalls or performance gaps between the current gaps and the required state. It articulates DOE expectations for safety in design based on a pre-conceptual hazard analysis and categorization, when applicable and appropriate, as prescribed in DOE STD 1189-2008. Mission needs are reassessed after major changes in a program, at budget submission, and at Critical Decisions.
D2	Acquisition Strategy/Plan	An Acquisition Strategy/Plan has been developed and approved in accordance with DOE requirements and orders. The acquisition strategy and plans should be sufficient to accomplish the project using a tailored approach, as appropriate. The project is in compliance with the site/complex strategic plan. The approved Acquisition Strategy supports all contracts, subcontracts, long lead procurements, and major procurements (both foreign and domestic) for the project. The plan addresses the methodology of incorporating project specific issues [such as, nuclear quality assurance-1 (NQA-1)].
D3	Key Project Assumptions	A complete list of critical facts and circumstances that would affect project outcome if changed is available. These assumptions have been reviewed and approved by appropriate parties. Project assumptions are reflected in technical/cost/schedule baselines and risk management plans. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.

D4	Project Execution Plan (PEP)	<p>The PEP has been developed and approved in accordance with DOE requirements/orders. The PEP is the primary agreement on project planning and objectives between all parties, and establishes roles and responsibilities and defines how the project will be executed, including tailoring general requirements and processes to the specifics of the project. The PEP should include:</p> <ul style="list-style-type: none"> · Performance Baseline (Scope, Cost and Schedule), including a Resource Loaded Schedule for the duration of the project. · Identification of any long-lead equipment and materials (including the technical basis for equipment sizing as well as a risk analysis with respect to long-lead equipment being properly sized). · Project organization and roles and responsibilities. · Process for baseline change control and configuration management. · Discussion of planned design reviews and how they are to be conducted. · Project quality assurance organization and implementation approach. <p>The PEP has been updated to reflect current project status, plans and performance baseline.</p> <p>-</p> <p>Note: The <u>Preliminary</u> Project Execution plan (PPEP) which is required at CD-1, should be based on a defined concept and, although not fully developed, is expected to contain substantial detail in all of the areas listed above. Thus a compliant PPEP would be rated at an expected maturity value of 3.</p>
D5	Integrated Project Team (IPT) and Charter	<p>The project organization and IPT charter are in place and functioning. The Integrated Project Team (IPT) has been in place since early project phases. The IPT participants' roles and responsibilities are clearly articulated. The composition of the IPT reflects the major areas of expertise needed to execute the project. The project is staffed with sufficient numbers of project management, technical, and acquisition specialists suitably qualified to accomplish project objectives. A qualified (certification level) Federal Project Director has been identified and formally assigned.</p>
D6	Conceptual Design Report (CDR)	<p>The CDR -should have detailed supporting documentation for the recommended alternative, Total Project Cost range, and the system requirements and applicable codes and standards for design and construction, to include environmental, safety and security considerations. Conceptual design drawings have been reviewed by an independent team with appropriate engineering disciplines and relevant experience. Review comments have been documented and disposed with supporting rationale. CDR has been approved by DOE. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.</p>
D7	Baseline Change Control	<p>There is a DOE approved process to review and approve proposed changes to cost, schedule, and technical baselines and to determine the impact of changes. Baseline Change Control Boards (CCB) are established at appropriate levels of the organization, the thresholds for each level are defined, and appropriate procedures are in place and being used. The process is described in the Project Execution Plan.</p>

D8	Project Control	A project control system is being used to manage the project baseline applying earned value techniques, variance analysis, contingency/management reserve and effective reporting in accordance with DOE Orders and guidelines.
D9	Project Work Breakdown Structure (WBS)	Project Work Breakdown Structure is established and reflects the project through completion. WBS dictionary is complete, including a detailed Statements of Work (SOWs). Project schedule and costs directly aligned with WBS structure, and deliverables are defined. The WBS is defined to an appropriate level of detail needed to successfully manage the project.
D10	Resources Required (People/Material) for Next Phase	The resources required for next phase are identified and available. These resources are reflected in the resource-loaded schedule.
D11	Configuration Management	A configuration management program is functioning to ensure consistency among requirements, criteria, design, existing facilities, physical configuration, and interfaces within project documents. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
D12	Project Risk Management Plan/Assessment	A risk management plan is developed and is included in the Acquisition Strategy/Plan and/or PEP, as appropriate. A risk mitigation strategy is in place. Project risk (technical and programmatic) is an accurate and complete estimate of the probability and severity of cost, schedule and other impacts (environment and safety) associated with uncertainties in the project, including a time-frame in which these risks are expected to occur. Risks are tracked, reported, and controlled. Project risks are reflected in the project cost estimate and schedule. Risk Mitigation Plans/Strategies have been identified in the plan and included in the Performance baseline. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and appropriate. Risk Management and Ownership continues to be actively used, as demonstrated by periodic (i.e. at least quarterly) updates of the risk register and regular reporting and re-evaluation and status reporting of cost and schedule contingency.
D13	Quality Assurance Program	A quality management system is defined and integrated into the processes governing activities that implement the project mission in compliance with requirements of 10CFR 830 Subpart A, Quality Assurance Requirements, DOE O 414.1C, Quality Assurance, and other applicable project specific quality requirements. A Quality Assurance (QA) program/plan is established. QA factors, including standards, specifications, and limitations are identified and have been communicated to the project staff and contractors. A Quality Control (QC) and QA oversight organization is in place and functioning. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.

D14	Value Engineering	Where appropriate, a value engineering program complying with DOE Orders is in place and qualified personnel have analyzed appropriate project functions using accepted industry techniques with the aim of improving performance, reliability, quality, safety and life cycle costs of products, systems or procedures. The value engineering analyses are documented in a formal report and have provided unbiased, outside opinion and/or senior expertise (as appropriate) as inputs to the design process and an independent review of concept, design, and schedule. Measures, taken to minimize project cost and maximize the return on investment for delivering the project, have been documented and cost savings have been quantified. Project criteria have been re-evaluated when value engineering analyses have determined them to have poor value or a high cost-to-worth ratio. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
D15	Procurement Packages	Procurement packages are being developed in accordance with the Acquisition Plan and will have added details for Design-Build procurements (if appropriate). Contractor selection processes and procedures are in place. Procurement packages reflect all requirements for security, safety and environmental considerations and pass on appropriate responsibilities and risks to contractors and subcontractors.
D16	Project Acquisition Process	The project is being accomplished in accordance with the established DOE Project Acquisition Process and in compliance with DOE O 413.3A, Program and Project Management for the Acquisition of Capital Assets, including Critical Decisions and Energy System Acquisition Advisory Boards (ESAAB) or the ESAAB-equivalent process.
D17	Integrated Regulatory Oversight Program	Applicable Federal, state, and local government permits, licenses, and regulatory approvals, including strategies and requirements are identified and obtained in a timely manner or milestone dates established. Schedule for receipt of authorization from regulators should be realistic based on experience. Requirements and milestone dates are updated as necessary and kept current. Regulators are stakeholders and have been involved with the project since its planning phase.
D18	Inter-Site and On-Site Coordination	Key inter-site and on-site coordination issues are identified, addressed and resolved or plans are in place to accomplish their resolution.
D19	Stakeholder Program	A stakeholder program was established early in the planning phase of the project to take into account the concerns and ideas of Federal, state and local regulators, local citizens, the project staff, the laboratory, DOE' site office, the Program Office, and other entities involved in the planning, design, or implementation of the project. The stakeholder program includes a mechanism for incorporating stakeholder feedback into the planning process and for communication between the project team and stakeholders in a timely and meaningful way.
D20	Funds Management	A funds management system is in place to ensure funds are allocated to support the project baseline elements for the current fiscal year. A system is in place to periodically review the annual costs to ensure that the annual funding will not be exceeded.

D21	Reviews/Assessments	Reviews (including External Independent Reviews (EIRs), Independent Project Reviews (IPRs) and Technical-IPRs) and assessments are performed and the findings, assessments, and recommendations are documented and presented to appropriate levels of management. A Corrective Action Plan is in place and being monitored and implemented, as necessary. Appropriate reviews and self-assessments are conducted as an integral part of the project, based on project complexity, size, duration and Critical Decision points.
E. SAFETY AND SECURITY		Criteria for Maximum Rating
E1	Hazard Analysis/Safety Documentation	<p>Addressing hazards early ensures that safety is “designed in” early instead of “added on” later with increased cost and decreased effectiveness. Hazards include both project hazards (such as fire hazards, criticality, radiological, chemical, and explosives), as well Natural Phenomena Hazards such as earthquakes, flood, hurricanes, and lightening. Analysis of hazards results in the identification of potential accident scenarios and the determination of how to prevent or mitigate the accidents. Structures, systems, and components (SSCs) are identified and incorporated into the design to prevent or mitigate the consequences of hazards to the facility worker, the collocated worker and the public. These SSCs are classified as safety class, safety significant, or defense in depth as required by the safety function.</p> <p>Requirements on the Integrated Safety Management System (ISMS) to be followed are described in DOE P 450.4, Safety Management Policy, dated 10-15-96. New nuclear facility design activities or major facility modifications as defined in 10CFR 830, Subpart B, -must be conducted in accordance with DOE O 420.1B, Facility Safety, dated 12-22-05; DOE STD 1189-2008; and 10 CFR 851.</p> <p>The ISMS process is applied to all Critical Decisions (CDs) and the Office of Health, Safety and Security (HSS) activities and documentation (among others as applicable and appropriate) that should be followed by the project are described below:</p> <p><u>Prior to CD-0 (Mission Need):</u></p> <ul style="list-style-type: none"> • Inventory of available documents based on existing facilities/sites identified in the scope of the project to facilitate hazard analysis and project planning. • Identify the potential hazards and their safety and risk implications in the mission need statement. • Include in the mission need DOE expectations for safety in design; identification of Safety in Design Tailoring Strategy; and identification of high level applicable safety regulations, safety codes, and safety standards (e.g. DOE O 420.1B, etc.).

E1	Hazard Analysis/Safety Documentation (continued)	<p><u>CD-0 to CD-1 (Alternative Selection and Cost Range):</u></p> <ul style="list-style-type: none"> • Documented Hazard Analysis of the conceptual design that identifies project hazards and natural phenomena hazards associated with systems for material processing, treatment, storage, and radioactive, chemical, and hazardous waste disposition. • Hazardous conditions and associated likelihoods and consequences, both mitigated and unmitigated for each reasonable alternative are documented. Hazards have been identified for control under safety management programs (Integrated Safety Management System, industrial safety, radiation protection, etc.) or uniquely analyzed under a Design Basis Accident (DBA). • Development of a Safety Design Strategy, Conceptual Safety Design Report, and a Conceptual Safety Validation Report (DOE STD 1189-2008, Sections 2.3 and 4.2) and integrate into project planning documentation. • SSCs that prevent or mitigate the frequency and/or consequences of DBAs associated with project hazards and natural phenomena hazards (NPH) are identified. • Requirements for worker safety, radiation safety, criticality safety, fire safety, industrial safety, and life safety are identified and incorporated into the project Facility and Operational Requirements, and design criteria documentation. • Determine the qualified safety and health professionals in the Integrated Project Team necessary to support the Federal Project Director. <p><u>CD-1 to CD-2 (Performance Baseline):</u></p> <p>Safety analysis activities should be integrated and performed concurrently and iteratively with design activities in order to establish an accurate and defensible performance baseline that adequately incorporates nuclear safety basis requirements, as applicable. Safety basis documents that are developed for CD-2 are:</p> <ul style="list-style-type: none"> • Completed Preliminary Safety Design Report and the Preliminary Safety Validation Report. • Updated Safety Design Strategy • Requirement for worker safety, radiation safety (including ALARA), criticality safety, industrial safety, fire safety, life safety, and chemical safety identified and incorporated into the project design. <p><u>CD-2 to CD-3 (Start of Construction):</u></p> <ul style="list-style-type: none"> • The Hazard Analysis Report has been updated, reviewed and approved. • Completed Preliminary Documented Safety Analysis (PDSA) and the Safety Evaluation Report. • Before the detailed design of the facility is accepted, all design requirements that were generated from safety considerations should be documented in the PDSA. • The Integrated Safety Management Process has been validated for construction activities.
E2	Integrated Safeguards & Security Planning	<p>The security approach and potential requirements for the project are documented to aid in the development of the integrated safeguard and security plan. Safeguard and security requirements are identified and documented and incorporated into detailed design drawings and specifications. Security levels are appropriate for the designation of the facility as nuclear or non-nuclear.</p>

E3	E3 ES&H Management Planning	Environmental, safety and health requirements, as delineated in Federal, DOE, state, site and local laws and regulations, are included in the project design requirements. Any exceptions are documented, justified and approved. The requirements, methodology, and responsibility for ES&H activities are clearly communicated. An Integrated Safety Management System (ISMS) has been implemented in support of the project in accordance with the requirements of DEAR 970-5204-2. The site's ISMS Document includes mechanisms for integrating ISM into the project activities and these mechanisms have been implemented. Safety Plans include fire, occupational, radiological, industrial hygiene, etc., and are complete, thorough and an integral part of all design efforts. Site procedures and mechanisms ensure that during the project planning, hazards are analyzed, controls are identified, and feedback and improvement programs are in place and effective. Line managers are using these processes effectively, consistent with their management functions, responsibilities and authorities.
E4	E4 Emergency Preparedness	Emergency planning and preparedness considerations are adequately reflected in the project design and meet emergency preparedness requirements of DOE O 151.1D and DOE O 420.1C, where appropriate. Emergency response services and related factors are considered in the facility site selection. Specialized issues and considerations for emergency preparedness are adequately identified and documented. Preparedness planning is complete for the disposition effort, and post-disposition emergency planning has been initiated, if appropriate. This planning has been coordinated with site and external response organizations. Specialized issues and considerations for emergency preparedness are adequately identified and documented.

5.0 EM CDAT ELEMENTS/DEFINITIONS FOR ENVIRONMENTAL RESTORATION CLEAN-UP PROJECTS

Table 5-1 2018 Environmental Restoration EM Project Critical Decision Assessment Tool (CDAT) CDAT - Environmental Restoration Projects -CERCLA/RCRA (Including D&D Projects accomplished under CERCLA)									
		Weigh ting Design ation	Weigh ting Factor	CERCLA Preliminary Analysis/Site Investigation or RCRA Facility Assessment (CD-0 / ~1)		CERCLA Remedial Investigation/Fe asibility Study (or EE/CA) or RCRA Facility Investigation/C orrective Measures Study (CD-1/2)		CERCLA Remedial Design/Remedi al Action or RCRA Corrective Measure (CD- 2/3)	
				Expect ed Maturi ty Value	Target Score	Expect ed Maturi ty Value	Target Score	Expect ed Maturi ty Value	Target Score
A. COST									
A1	Cost Estimate	H	7.5	1	7.5	2	15	5	37.5
A2	Cost Risk/Contingency Analysis	P	3	1	3	2	6	5	15
A3	Funding Requirements/Profil e	H	7.5	1	7.5	2	15	5	37.5
A4	Independent Cost/Schedule Review	P	3.0	N/A	0	2	6	5	15
A5	Life Cycle Cost	P	3	1	3	2	6	5	15
A6	Forecast Cost at Completion	P	3	N/A	0	3	9	5	15
A7	Cost Estimate for Next Phase Work Scope	P	3	5	15	5	15	5	15
Subtotal Cost Element					36		72		150
B. SCHEDULE									
B1	Project Schedule	H	7.5	1	7.5	2	15	5	37.5
B2	Major Milestones	P	3	1	3	2	6.0	5	15
B3	Resource Loading	P	3	1	3	1	3	5	15
B4	Critical Path Management	H	7.5	1	7.5	1	7.5	5	37.5

B5	Schedule Risk/Contingency Analysis	P	3	1	3	1	3	5	15
B6	Forecast of Schedule at Completion	P	3	1	3	3	9	5	15
B7	Schedule for Next Phase Work Scope	P	3	5	15	5	15	5	15
Subtotal Schedule Element					42		59		150
C. SCOPE/TECHNICAL									
C1	Preliminary Assessments/Site Investigation	P	2.2	5	10.9	5	10.9	5	10.9
C2	Remedial Investigation/RCRA Facility Investigation (includes Baseline Risk Assessment)	P	2.2	2	4.4	5	10.9	5	10.9
C3	Feasibility Study (FS)/Corrective Measures Study (CMS)	H	3.5	2	7.0	5	17.5	5	17.5
C4	Engineering Evaluation/Cost Analysis of Removal Actions/Early Action	H	3.5	2	7.0	5	17.5	5	17.5
C5	Performance Assessment (PA)	P	2.2	1	2.2	5	10.9	5	10.9
C6	Technology Needs Identified and Available	P	2.2	3	6.6	4	8.8	5	10.9
C7	Technology Needs Demonstrated	H	3.5	N/A	0.0	1	3.5	5	17.5
C8	Performance Requirements	P	2.2	1	2.2	3	6.6	5	10.9
C9	Waste Acceptance Criteria (WAC)	P	2.2	1	2.2	3	6.6	5	10.9
C10	Proposed Plan (PP)	P	2.2	1	2.2	2	4.4	5	10.9
C11	CERCLA Record of Decision (ROD)/Action Memo (AM)	P	2.2	N/A	0.0	2	4.4	5	10.9

C12	Natural Phenomena	P	2.2	1	2.2	3	6.6	5	10.9
C13	Remedial Design/D&D Plans	H	3.5	N/A	0.0	N/A	0.0	5	17.5
C14	Equipment Needs	P	2.2	N/A	0.0	2	4.4	5	10.9
C15	Remedial/D&D Design/Plans, Technical, and Safety-related Reviews for this phase	P	2.2	N/A	0.0	4	8.8	5	10.9
C16	Waste Storage, Packaging and Transportation	H	3.5	1	3.5	2	7.0	5	17.5
C17	Training Requirements	P	2.2	N/A	0.0	1	2.2	5	10.9
C18	Waste Characterization and Disposition	H	3.5	1	3.5	3	10.5	5	17.5
C19	Pollution Prevention & Waste Minimization	H	3.5	N/A	0.0	2	7.0	5	17.5
C20	Environmental Monitoring Plan	P	2.2	1	2.2	2	4.4	5	10.9
C21	NEPA Documentation (RCRA Projects)	H	3.5	1	3.5	3	10.5	5	17.5
C22	End Point Criteria and Closure Plan/Permit Modification	H	3.5	1	3.5	3	10.5	5	17.5
C23	Long Term Surveillance and Monitoring Plan/Post Disposition Monitoring Plan	P	2.2	N/A	0.0	2	4.4	5	10.9
C24	Permits, Licenses, and Regulatory Approvals	H	3.5	N/A	0.0	3	10.5	5	17.5
C25	Plot Plan	P	2.2	2	4.4	4	8.8	5	10.9
C26	Site/Facility Characterization (Including Surveys and Soil Tests) and radioactive inventory	P	2.2	2	4.4	3	6.6	5	10.9
Subtotal Scope/Technical					72		204		350
Element									

D. MANAGEMENT PLANNING AND CONTROL									
D1	Mission Need Statement	H	2.9	5	14.3	5	14.3	5	14.3
D2	Acquisition Strategy/ Plan	H	2.9	1	2.9	5	14.3	5	14.3
D3	Key Project Assumptions	P	1.5	1	1.5	4	6.2	5	7.7
D4	Project Execution Plan (PEP)	H	2.9	1	2.9	3	8.6	5	14.3
D5	Integrated Project Team (IPT) and Charter	P	1.5	1	1.5	3	4.6	5	7.7
D6	Integrated Regulatory Oversight Program	P	1.5	1	1.5	4	6.2	5	7.7
D7	Baseline Change Control	H	2.9	1	2.9	4	11.4	5	14.3
D8	Project Control	P	1.5	N/A	0.0	3	4.6	5	7.7
D9	Project Work Breakdown Structure (WBS)	P	1.5	1	1.5	4	6.2	5	7.7
D10	Resources Required (People/Material) for Next Phase	P	1.5	4	6.2	5	7.7	5	7.7
D11	Configuration Management	H	2.9	2	5.7	3	8.6	5	14.3
D12	Project Risk Management Plan/Assessment	H	2.9	1	2.9	3	8.6	5	14.3
D13	Quality Assurance Program	P	1.5	2	3.1	4	6.2	5	7.7
D14	Value Engineering, Trade-Off, and Optimization Studies	P	1.5	1	1.5	3	4.6	5	7.7
D15	Procurement Packages	P	1.5	N/A	0.0	1	1.5	5	7.7
D16	Project Acquisition Process	P	1.5	1	1.5	5	7.7	5	7.7
D17	Funds Management	P	1.5	1	1.5	3	4.6	5	7.7

D18	Reviews/Assessments	P	1.5	2	3.1	5	7.7	5	7.7
D19	Stakeholder Program	H	2.9	2	5.7	4	11.4	5	14.3
D20	Inter-Site and On-Site Coordination	P	1.5	2	3.1	3	4.6	5	7.7
Subtotal Management Planning and Control Element					63		149		200
E. SAFETY									
E1	Hazard Analysis/Safety Documentation	P	5	1	5	3	15	5	25
E2	Integrated Safeguards and Security Planning	P	5	1	5	3	15	5	25
E3	ES&H Management Planning (Including ISM)	H	15	N/A	0	2	30	5	75
E4	Emergency Preparedness	P	5	N/A	0	1	5	5	25
Subtotal Safety Element					48		108		150
TOTAL					261		592		1000

Master EM Critical Decision Assessment Tool (CDAT) – Environmental Restoration/Cleanup Project Definitions

The following definitions describe the criteria required to achieve a maximum rating or maturity value of 5. It should be assumed that maturity values of 1-5 represent a subjective assessment of the degree of definition and/or the degree to which the end-state or maximum criteria have been met, or the product has been completed in accordance with the definition of maturity values.

Table 5-2

2018 EM Restoration Project Critical Decision Assessment Tool - CERCLA/RCRA Project- Definitions and Target Score Criteria (Including D&D Projects accomplished under CERCLA)

The following definitions describe the criteria required to achieve a maximum rating or maturity value of 5. It should be assumed that maturity values of 0-5 represent a subjective assessment of the quality of definition and/or the degree to which the end-state or maximum criteria have been met, or the product has been completed in accordance with the definition of maturity values.

Criteria for Maximum Rating

A. COST		Criteria for Cost Estimate Ratings			
A1	Cost Estimate	A cost estimate has been developed and formally approved by FPD and is the basis for the cost baselines. The cost estimate is a reasonable approximation of Total Project Costs (TPCs), and covers all phases of the project. The estimate is prepared in accordance with DOE requirements. The estimate bases are fully documented and traceable. Supporting backup information has been collected and organized and is available in a central file or location. Major estimate assumptions, especially those affecting major cost drivers, are fully documented and explained. Estimate exclusions or qualifications are clearly documented. Estimated costs are time-phased and escalated using current DOE or other justifiable escalation rates. For cost estimate point values AACEI Cost Recommended Practice 17R-97 is a useful reference. A Class I (CDAT score of 5) estimate is developed from quantity take offs from completed design plans and specifications. Whereas the Class 5 estimate (CDAT score 1) is of a rough order of magnitude estimate useful for determining the range of costs for various alternatives at CD-0.			
		Project Phase (DOE O 413.3B)	Level of Project Definition	Estimate Class	CDAT Maturity Value
		CD-0/Approve Mission Need	0% to 15%	Class 4/5	1
		CD-1/Approve Alternative Selection & Cost Range	10% to 15%	Class 3	2
		CD-2/Approve	30% to 70%	Class 2	3-4

		CD-3/Approve Start of Construction	50% to 100%	Class 1	5
		Criteria for Maximum Rating			
A2	Cost Risk/Contingency Analysis	The cost estimate includes contingency allowances developed in accordance with DOE guidance. In addition to any deterministic contingency analyses that may have been developed, a probabilistic risk analysis has been performed. The assumptions, rationale and methodology used to perform the probabilistic analysis are explained. The cost risk analysis builds on and is tied to the Project Risk Management Plan. Risk mitigation costs, if appropriate, have been included in the baseline cost estimate, or addressed by the risk analysis model. Costs related to schedule contingency also are included. The use of management reserve by contractors in procurement actions has been evaluated. The confidence level of the baseline cost estimate is clearly stated and explained. All of the preceding requirements are documented in the project record.			
A3	Funding Requirements/Profile	Funding requirements have been defined and the project timeline is in compliance with the DOE budget timeline/process. Required budget documentation, including Project Data Sheets (where required), reflects current project cost and schedule estimates/forecasts. The funding profile is based on quantified resource requirements derived from the cost estimate, time-phased through integration with the project baseline schedule. Resource constraints (personnel, budget authorizations, etc.) have been considered when developing the project schedule, and an iterative process used to correlate the cost estimate, schedule and funding profile. The funding profile is based on full consideration of available or expected budget or funding levels for the project. The impact of any projected funding shortfalls has been assessed and management strategies developed to accommodate those shortfalls have been considered and incorporated in the project plans. All of the preceding requirements are documented in the project record.			
A4	Independent Cost/Schedule Review	In addition to any internal cost and schedule estimate reviews, the cost estimate and schedule have been subjected to an independent review by an organization not directly involved with the project (Independent Cost Estimate, when required). The independent review has been documented, including the techniques used and type of review performed. The results, findings and recommendations of the independent review have been reconciled with the cost and schedule estimates and changes have been incorporated.			
A5	Life Cycle Cost	The project Life Cycle Costs (LCC) includes relevant assumptions, bases of estimate, qualifications, and exclusions. LCC includes the estimated cost for government commitments that result from execution of this project, including downstream projects/facilities and eventual disposition of the facilities constructed for this project. The LCC estimate should meet the requirements of Office of Management and Budget directives and DOE Orders and guidance. LCC of competing projects or alternative strategies are estimated and documented on a comparable basis. For nuclear projects, or other projects with significant safety hazards, accidents mitigation costs associated with structures, systems, and components (SSCs) have been included. For high hazard facilities, safety mitigation costs are often a key discriminator in competing projects or alternatives.			

A6	Forecast of Cost at Completion	The cost baseline is approved and the measurement of actual performance is begun, forecasts of costs at completion (actual costs to-date plus “to-go” costs) are developed and issued at regular intervals. Cost forecasts are developed in accordance with project procedures. Key assumptions supporting the baseline estimate are documented and periodically re-evaluated and the impacts of changing assumptions are reflected in the estimates of “to-go” costs. Forecasts are related to the Change Control system and incorporate both approved and pending changes, as appropriate. The forecast of cost at completion is a reasonable projection based on the status of the project and experience to-date.
A7	Cost Estimate for Next Phase of Work	A detailed cost estimate is prepared and approved for the work scope to be accomplished during the next phase of the project (i.e., the efforts needed to successfully complete the prerequisites for the next Critical Decision). Cost estimates are defensible with an appropriate level of supporting detail and documentation. Assumptions are clearly documented and stated.
B. SCHEDULE Criteria for Maximum Rating		
B1	Project Schedule	A schedule has been developed, documented and approved by DOE, is identified in regulatory milestones, and is the basis for the Schedule Baseline. The schedule is a reasonable layout of project activities for all phases of the project and is at a level of development that will allow project execution. Included project activities are consistent with the Work Breakdown Structure (WBS), and the schedule is prepared in accordance with DOE guidance and practices. The schedule is activity-based and includes milestones, reasonable durations and acceptable logic. Schedules and milestones should align after negotiations and change packages are complete. Lower level schedules are developed and tiered to support the baseline schedule and/or Project Master Schedule. Project-specific conditions are included. Assumptions are defined. Interface requirements (including technology development and Government Furnished Services and Items (GFSI) are incorporated into the schedule. The baseline schedule covers the full scope of the project through CD-4, including operations phases, if any. An appropriate method of developing the schedule is used. Including an acceptable software package. The project schedule has undergone an independent documented check for completeness and accuracy.
B2	Major Milestones	Milestones are included at each level of the project schedule to establish a baseline and indicate significant progress against the work to be completed. Stakeholder and regulatory milestones are included, as appropriate. Milestones are tiered to support project decisions, performance, approvals, etc. A milestone dictionary is provided which defines the requirements for successful completion. An appropriate number of milestones are included to control the project.
B3	Resource Loading	The schedule is resource loaded, considers critical resources, and is consistent with the funding profile. The resource loading is documented, and is reasonable, considering such elements as ramp-up, lead times, constraints, etc.
B4	Critical Path Management	A Critical Path is defined. Near-Critical Path activities are identified and sensitivity analyses have been conducted. Schedule management practices are properly focused on Critical Path and Near-Critical Path activities.

B5	Schedule Risk/Contingency Analysis	A probabilistic risk assessment has been conducted on the baseline schedule, and appropriate contingency added, as required. Assumptions, rationale, and methodology, used in the analysis are documented. Schedule risks are fully integrated with the risk management plan.
B6	Forecast of Schedule at Completion	The schedule baseline is approved and the measurement of actual performance has begun, forecasts of completion dates are developed and issued at regular intervals in addition to presentations of schedule progress. Schedule forecasts reflect actual performance, to date, and projections. Forecasts are related to the Change Control system and incorporate both approved and pending changes.
B7	Schedule for Next Phase of Work	A detailed schedule is approved for activities to be accomplished during the next phase of the project (i.e., the efforts needed to successfully complete the prerequisites for the next phase of remediation, D&D or the next Critical Decision). The schedule is defensible with an appropriate level of supporting detail and documentation.
C. SCOPE/TECHNICAL Criteria for Maximum Rating		
C1	Preliminary Assessment/Site Investigation	The Preliminary Assessment/Site Investigation is complete and approved.
C2	Remedial Investigation/RCRA Facility Investigation (includes Baseline Risk Assessment)	The Remedial Investigation (or RCRA Facility Investigation), including the Baseline Risk Assessment, is complete and approved.
C3	Feasibility Study (FS)/Corrective Measures Study (CMS)	The FS (or Corrective Measures Study) is complete and has been approved by all applicable parties.
C4	Engineering Evaluation/Cost Analysis of Removal Actions/Early Actions	For CERCLA removal (early) actions, the Engineering Evaluation/Cost Analysis (EE/CA) is complete, the public comment period is complete, and DOE has approved the document.
C5	Performance Assessment (PA)	The Site PA is completed, reviewed by an independent team, and approved
C6	Technology Needs Identified and Available	Technology to be used has been identified and is currently available. If new technology is required, a technology development schedule supports the project schedule.

C7	Technology Needs Demonstrated	New technology has been tested and determined to meet project objectives (technical, cost and schedule). Maturity of new technology to be used has been evaluated and factored into risk analysis by means of a Technology Readiness Assessment, or its equivalent (Reference: DOE G 413.3-4, <i>Technology Readiness Assessment Guide</i> , dated 10-12-09). An evaluation of the inappropriateness of existing technology has been documented to justify the need. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and are appropriate.
C8	Performance Requirements	Functional and performance requirements for the project are documented (approved by users and key stakeholders), and under configuration control.
C9	Waste Acceptance Criteria (WAC)	The on-site or off-site Waste Acceptance Criteria is documented, approved, and the requirements included into the design requirements for the project.
C10	Proposed Plan (PP)	For CERCLA remedial actions, the PP is complete and the public comment period is complete.
C11	CERCLA Record of Decision (ROD)/Action Memorandum (AM)	The ROD is complete and has been signed by DOE, the state, and EPA. For CERCLA removal actions, the AM is complete. The public comment period is complete, and DOE has approved the document.
C12	Natural Phenomena	Seismic, tornadoes, hurricanes, tropical storms, and other natural phenomena are considered in the remedy selection, remedial design, and are documented. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and be appropriate for D&D/restoration type projects.
C13	Remedial Design/D&D Plans	The Remedial Design (or RCRA Corrective Measures Design) is complete and approved.
C14	Equipment Needs	Equipment needs have been identified and procurement schedules established. All engineered equipment and/or materials fully specified, bid, and tabulated as necessary to support project schedule.
C15	Remedial/D&D Design/Plans, Technical, and Safety-related Reviews for this phase	Remedial/D&D design, plans, technical and safety-related reviews of applicable planning documents have been conducted at each appropriate project phase. They have been performed by a multi-functional team representing appropriate disciplines and, if appropriate, external experts have been utilized. Review results, comments and resolutions have been documented and accepted by reviewers. Safety issues have been resolved.
C16	Waste Storage, Packaging and Transportation	Storage, packaging and transportation requirements for nuclear and hazardous materials and wastes are identified and documented, including both off-site and in-plant transportation, as well as methods and equipment (casks, overpacks, etc.) for packaging, receiving/shipping materials (e.g., rail, truck, air, marine). The waste packaging and shipping requirements are identified, documented and included into the project design. Storage areas have required permits. Storage, packaging, and transportation specifications are fully identified for each waste stream.

C17	Training Requirements	Training requirements defined, planned and scheduled. Design considerations have been incorporated as appropriate. Simulation and/or mockup facilities are defined and established as necessary.
C18	Waste Characterization and Disposition	Waste streams generated (gaseous, solid, and liquid, both hazardous and non-hazardous) through construction, demolition, or environmental cleanup are sufficiently characterized to identify appropriate disposition alternatives and worker protection levels and documented in a Waste Management Plan. Samples have been collected, analyzed and validated to produce reliable, high quality data. Necessary plans and actions have been taken to confirm conditions, prepare documents and perform the discovery action, including resolving surveillance and monitoring activities and safety considerations. Historical data and process knowledge are fully documented. All waste streams have their disposition finalized and included in the project costs, risks and schedule. The on-site or off-site Waste Acceptance Criteria are documented, approved, and included in the planning/design for the project
C19	Pollution Prevention and Waste Minimization	A detailed waste minimization/pollution prevention plan for the project, including any operational phases is complete. A description, estimated costs, and present implementation plan for design, operation, and mitigation features that will minimize wastes and prevent pollution are approved. A detailed waste management plan describing quantities and types of wastes to be generated and plans for their waste treatment, storage or disposal are complete. The plan should: <ul style="list-style-type: none"> ▪ Support the waste management cost estimate for the cleanup and any processes. ▪ Identify project options for waste treatment, storage, and disposal, including availability of future disposal capacity and sites. ▪ Integrate waste management plans with waste minimization/pollution prevention plans. ▪ Characterize regulatory benefits and concerns associated with types and quantities of wastes expected.
C20	Environmental Monitoring Plan	The plan for monitoring the actual performance of the release site or disposal facility during construction is completed, approved, and implemented. The respective Performance Assessment (PA) is changed as needed.
C21	NEPA Documentation (Not Applicable to projects conducted under CERCLA Regulations)	All NEPA activities, including NEPA strategy and requirements, are complete and compliant with DOE Orders, as necessary. (Not Applicable to projects conducted under CERCLA Regulations)
C22	End Point Criteria and Closure Plan/Permit Modification	End Point Criteria have been defined, documented and approved for soils, groundwater, facilities, spaces, systems, materials and wastes, consistent with meeting the established end state for the project. The Closure Plan for the release site or facility is documented and approved.
C23	Long Term Surveillance and Monitoring Plan/Post	The draft Long Term Surveillance and Monitoring Plan is complete. This plan will be finalized and approved at the conclusion of remediation/construction. For D&D, the Post Disposition Monitoring Plan is prepared, approved, and ready for implementation by the performing organization

	Disposition Monitoring Plan	
C24	Permits, Licenses, and Regulatory Approvals	Environmental regulations are identified. Potential environmental permitting issues have been identified. Strategy for addressing environmental permitting issues is defined and documented. Environmental permitting authorities have been contacted and briefed on potential releases to the environment, and the project approach to meeting requirements for air emissions, water discharges, land disposal, and disposition of waste streams. Requirements have been defined and incorporated into design criteria for air emissions, wastewater discharges, land disposal of hazardous wastes, and disposition wastes. Planning and design are consistent with approved environmental permitting requirements. All wastes have a path forward for ultimate disposition. Applicable permits, licenses, and regulatory approvals obtained and milestone dates for pending and new applications reviewed and revised as appropriate. All permits, licenses, and approvals necessary to construct and operate a facility or to initiate and perform project activities are identified and will be obtained when needed to continue project execution on schedule. Schedule for receipt of authorization from regulators should be realistic based on experience.
C25	Plot Plan	<p>Plot plan is complete and shows location of the project in relation to adjoining facilities. It should include items such as:</p> <ul style="list-style-type: none"> § Buildings § Plant grid system with coordinates § Green space coordinates § Project boundaries § Major pipe racks § Temporary staging areas § Gates and fences § Laydown areas § Decontamination areas § Off-site facilities § Construction/fabrication areas § Rail facilities § Tank farms § Roads and access ways § Nearby residences § Major utilities § Surface water
C26	Site/Facility Characterization (Including Surveys and Soil Tests) and radioactive inventory	Assessment of site-specific requirements completed. Survey and soil test evaluations of proposed facilities/release sites have been completed. Investigation and development of facility/site-specific characteristics sufficient to support final remedial/D&D planning/design and key assumptions are clearly documented. As applicable, radioactive inventory is complete, surveys have been conducted, soil and facility samples have been taken. Evaluation of the results of the investigation and characterization work has been finalized.

D. MANAGEMENT PLANNING AND CONTROL Criteria for Maximum Rating		
D1	Mission Need Statement (MNS)	An approved Mission Need Statement exists. The project MNS demonstrates that the project relates to and supports execution of Program Strategic Plan goals and objectives as well as the DOE Strategic Plan. A MNS describes regulatory or other requirements that are the basis for this cleanup project. Mission needs are reassessed after major changes in a program, at budget submission, and at Critical Decisions.
D2	Acquisition Strategy/Plan	An Acquisition Strategy/Plan has been developed and approved in accordance with DOE requirements and orders. The acquisition strategy and plans should be sufficient to accomplish the project using a tailored approach, as appropriate. The project is in compliance with the site/complex strategic plan. The approved Acquisition Strategy supports all contracts, subcontracts, long lead procurements, and major procurements (both foreign and domestic) for the project. The plan addresses the methodology of incorporating project specific issues [such as, nuclear quality assurance-1 (NQA-1)].
D3	Key Project Assumptions	A complete list of critical facts and circumstances that would affect project outcome if changed is available. These assumptions have been reviewed and approved by appropriate parties. Project assumptions are reflected in technical/cost/schedule baselines and risk management plans. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and as appropriate.
D4	Project Execution Plan (PEP)	<p>The PEP has been developed and approved in accordance with DOE requirements/orders. The PEP is the primary agreement on project planning and objectives between all parties, and establishes roles and responsibilities and defines how the project will be executed, including tailoring general requirements and processes to the specifics of the project. The PEP should include:</p> <ul style="list-style-type: none"> • Performance Baseline (Scope, Cost and Schedule), including a Resource Loaded Schedule for the duration of the project. • Identification of any long-lead equipment and materials (including the technical basis for equipment sizing as well as a risk analysis with respect to long-lead equipment being properly sized). • Project organization and roles and responsibilities. • Process for baseline change control and configuration management. • Discussion of planned design reviews and how they are to be conducted. • Project quality assurance organization and implementation approach. <p>The PEP has been updated to reflect current project status, plans and performance baseline -Note: The Preliminary Project Execution plan (PPEP) which is required at CD-1, should be based on a defined concept and, although not fully developed, is expected to contain substantial detail in all of the areas listed above. Thus a compliant PPEP would be rated at an expected maturity value of 3.</p>

D5	Integrated Project Team (IPT) and Charter	The project organization and IPT charter are in place and functioning. The Integrated Project Team (IPT) has been in place since early project phases. The IPT participants' roles and responsibilities are clearly articulated. The composition of the IPT reflects the major areas of expertise needed to execute the project. The project is staffed with sufficient numbers of project management, technical, and acquisition specialists suitably qualified to accomplish project objectives. A qualified (certification level) Federal Project Director has been identified and formally assigned.
D6	Integrated Regulatory Oversight Program	Applicable Federal, state, and local government permits, licenses, and regulatory approvals, including strategies and requirements are identified and obtained in a timely manner or milestone dates established. Schedule for receipt of authorization from regulators should be realistic based on experience. Requirements and milestone dates are updated as necessary and kept current. Regulators are stakeholders and have been involved with the project since its planning phase.
D7	Baseline Change Control	There is a DOE approved process to review and approve proposed changes to cost, schedule, and technical baselines and to determine the impact of changes. Baseline Change Control Boards (CCB) are established at appropriate levels of the organization, the thresholds for each level are defined, and appropriate procedures are in place and being used. The process is described in the Project Execution Plan.
D8	Project Control	A project control system is being used to manage the project baseline applying earned value techniques, variance analysis, contingency/management reserve and effective reporting in accordance with DOE Orders and guidelines.
D9	Project Work Breakdown Structure (WBS)	Project Work Breakdown Structure is established and reflects the project through completion. WBS dictionary is complete, including a detailed Statements of Work (SOWs). Project schedule and costs directly aligned with WBS structure, and deliverables are defined. The WBS is defined to an appropriate level of detail needed to successfully manage the project.
D10	Resources Required (People/Material) for Next Phase	The resources required for next phase are identified and available. These resources are reflected in the resource-loaded schedule.
D11	Configuration Management	A configuration management program is functioning to ensure consistency among requirements, criteria, design, existing facilities, physical configuration, and interfaces within project documents. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and are appropriate.

D12	Project Risk Management Plan/Assessment	A risk management plan is developed and is included in the Acquisition Strategy/Plan and/or PEP, as appropriate. A risk mitigation strategy is in place. Project risk (technical and programmatic) is an accurate and complete estimate of the probability and severity of cost, schedule and other impacts (environment and safety) associated with uncertainties in the project, including a time-frame in which these risks are expected to occur. Risks are tracked, reported, and controlled. Project risks are reflected in the project cost estimate and schedule. Risk Mitigation Plans/Strategies have been identified in the plan and included in the Performance baseline. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and appropriate. Risk Management and Ownership continues to be actively used, as demonstrated by periodic (i.e. at least quarterly) updates of the risk register and regular reporting and re-evaluation and status reporting of cost and schedule contingency.
D13	Quality Assurance Program	A quality management system is defined and integrated into the processes governing activities that implement the project mission in compliance with requirements of 10CFR 830 Subpart A, Quality Assurance Requirements, DOE O 414.1C, Quality Assurance, and other applicable project specific quality requirements. A Quality Assurance (QA) program/plan is established. QA factors, including standards, specifications, and limitations are identified and have been communicated to the project staff and contractors. A Quality Control (QC) and QA oversight organization is in place and functioning. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and are appropriate.
D14	Value Engineering, Trade-Off, and Optimization Studies	Where appropriate, a value engineering program complying with DOE Orders is in place and qualified personnel have analyzed appropriate project functions using accepted industry techniques with the aim of improving performance, reliability, quality, safety and life cycle costs of remediation technologies, systems or procedures. The value engineering analyses are documented in a formal report and have provided unbiased, outside opinion and/or senior expertise (as appropriate) as inputs to the remedial/D&D design or EE/CA process and an independent review of concept, design, and schedule conducted. Measures, taken to minimize project life cycle costs and maximize the return on investment for delivering the project, have been documented and cost savings have been quantified. Project criteria have been re-evaluated when value engineering analyses have determined them to have poor value or a high cost-to-worth ratio. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply or be appropriate. The Trade-Off Studies are performed, as needed, to reach a reasonable level of project risk consistent with project phase and overall project cost/schedule. These trade-off studies are a part of conceptual and later design/planning phases to optimize the implementation design of the selected alternative. The studies include alternative requirements and controls, and optimization approaches with consideration of technical and safety requirements. The studies conducted should be well documented and the conclusions justified.

D15	Procurement Packages	Procurement packages are being developed in accordance with the Acquisition Plan and will have added details for Design-Build procurements (if appropriate). Contractor selection processes and procedures are in place. Procurement packages reflect all requirements for security, safety and environmental considerations and pass on appropriate responsibilities and risks to contractors and subcontractors.
D16	Project Acquisition Process	The project is being accomplished in accordance with the established DOE Project Acquisition Process and in compliance with DOE O 413.3A, Program and Project Management for the Acquisition of Capital Assets, including Critical Decisions and Energy System Acquisition Advisory Boards (ESAAB) or the ESAAB-equivalent process.
D17	Funds Management	A funds management system is in place to ensure funds are allocated to support the project baseline elements for the current fiscal year. A system is in place to periodically review the annual costs to ensure that the annual funding will not be exceeded.
D18	Reviews/Assessments	Reviews (including External Independent Reviews (EIRs), Independent Project Reviews (IPRs) and Technical-IPRs) and assessments are performed and the findings, assessments, and recommendations are documented and presented to appropriate levels of management. A Corrective Action Plan is in place and being monitored and implemented, as necessary. Appropriate reviews and self-assessments are conducted as an integral part of the project, based on project complexity, size, duration and Critical Decision points.
D19	Stakeholder Program	A stakeholder program was established early in the planning phase of the project to take into account the concerns and ideas of Federal, state and local regulators, local citizens, the project staff, the laboratory, DOE' site office, the Program Office, and other entities involved in the planning, design, or implementation of the project. The stakeholder program includes a mechanism for incorporating stakeholder feedback into the planning process and for communication between the project team and stakeholders in a timely and meaningful way.
D20	Inter-Site and On-Site Coordination	Key inter-site and on-site coordination issues are identified, addressed and resolved or plans are in place to accomplish their resolution.

E. SAFETY AND SECURITY	Criteria for Maximum Rating
E1 Hazard Analysis/Safety Documentation	<p>Addressing hazards early ensures that safety is “designed in” early instead of “added on” later with increased cost and decreased effectiveness. Hazards include both project hazards (such as fire hazards, criticality, radiological, chemical, and explosives), as well Natural Phenomena Hazards such as earthquakes, flood, hurricanes, and lightening. Analysis of hazards results in the identification of potential accident scenarios and the determination of how to prevent or mitigate the accidents. Structures, systems, and components (SSCs) are identified and incorporated into the remedial design to prevent or mitigate the consequences of hazards to the cleanup, facility worker, the collocated worker and the public.</p> <p>Requirements on the Integrated Safety Management System (ISMS) to be followed are described in DOE P 450.4, Safety Management Policy, dated 10-15-96. New nuclear facility design activities or major facility modifications as defined in 10CFR 830, Subpart B, -must be conducted in accordance with DOE O 420.1B, Facility Safety, dated 12-22-05; DOE STD 1189-2008; and 10 CFR 851.</p> <p>The ISMS process is applied to all Critical Decisions (CDs) and the Office of Health, Safety and Security (HSS) activities and documentation (among others as applicable and appropriate) that should be followed by the project are described below:</p> <p><u>Prior to CD-2/3:</u></p> <ul style="list-style-type: none"> • Inventory of available documents based on existing facilities/sites identified in the scope of the project to facilitate hazard analysis and project planning. • Identify the potential hazards and their safety and risk implications in the mission need statement or RI/FS. • Include in the mission need DOE expectations for safety in design; identification of Safety in Design Tailoring Strategy; and identification of high level applicable safety regulations, safety codes, and safety standards (e.g. DOE O 420.1B, etc.).

E1	Hazard Analysis/Safety Documentation (continued)	<p><u>CD-0 to CD-1 (Alternative Selection and Cost Range:</u></p> <ul style="list-style-type: none"> • Hazardous conditions and associated likelihoods and consequences, both mitigated and unmitigated for each reasonable alternative are documented. Hazards have been identified for control under safety management programs (Integrated Safety Management System, industrial safety, radiation protection, etc.). • Development of a Safety Design Strategy, • SSCs that prevent or mitigate the frequency and/or consequences of DBAs associated with project hazards and natural phenomena hazards (NPH) are identified. • Requirements for worker safety, radiation safety, criticality safety, fire safety, industrial safety, and life safety are identified and incorporated into the project Facility and Operational Requirements, and design criteria documentation. • Determine the qualified safety and health professionals in the Integrated Project Team necessary to support the Federal Project Director. <p><u>CD-2 to CD-3 (Performance Baseline):</u></p> <p>Safety analysis activities that may be required should be integrated and performed concurrently and iteratively with remedial/ D&D planning/design or EE/CA activities in order to establish an accurate and defensible performance baseline that adequately incorporates nuclear safety basis requirements, as applicable. Safety basis documents that are developed for CD-2/3 are:</p> <ul style="list-style-type: none"> • Updated Safety Plan - that demonstrates how an adequate safety plan is maintained on a step by step basis as the process of remediation/deactivation and dismantlement proceeds. • Requirement for worker safety, radiation safety (including ALARA), criticality safety, industrial safety, fire safety, life safety, and chemical safety identified and incorporated into the project design. • Hazard Analysis Report has been updated, reviewed and approved if required. <u>CD-2 to CD-3:</u> • The Integrated Safety Management Process has been validated for D&D/remediation activities.
E2	Integrated Safeguards & Security Planning	<p>The security approach and potential requirements for the project are documented to aid in the development of the integrated safeguard and security plan. Safeguard and security requirements are identified and documented and incorporated into remedial/D&D planning/design drawings, plans and specifications. Security levels are appropriate for the designation of the facility as nuclear or non-nuclear. Full consideration is given to the security of both the facility as well as the components as remediation/deactivation and dismantlement activities take place.</p>

E3	E3 ES&H Management Planning	Environmental, safety and health requirements, as delineated in Federal, DOE, state, site and local laws and regulations, are included in the project design requirements. Any exceptions are documented, justified and approved. The requirements, methodology, and responsibility for ES&H activities are clearly communicated. An Integrated Safety Management System (ISMS) has been implemented in support of the project in accordance with the requirements of DEAR 970-5204-2. The site's ISMS Document includes mechanisms for integrating ISM into the project activities and these mechanisms have been implemented. Safety Plans include fire, occupational, radiological, industrial hygiene, etc., and are complete, thorough and an integral part of all remedial/D&D planning/design, deactivation and dismantlement or EE/CA activities. Site procedures and mechanisms ensure that during the project planning, hazards are analyzed, controls are identified, and feedback and improvement programs are in place and effective. Line managers are using these processes effectively, consistent with their management functions, responsibilities and authorities.
E4	E4 Emergency Preparedness	Emergency management considerations are adequately reflected in the project planning and design and meet emergency preparedness requirements of DOE O 151.1C, <i>Comprehensive Emergency Management System</i> , and DOE O 420.1D, <i>Facility Safety</i> , where appropriate. Emergency response services and related factors are considered for the remedial/D&D site location. Specialized issues and considerations for emergency preparedness are adequately identified and documented. Preparedness planning is complete for the disposition effort, and post-disposition emergency planning has been initiated, if appropriate. This planning has been coordinated with site and external response organizations. Specialized issues and considerations (e.g., control of interrelated processes) for emergency management are adequately identified and documented. Planning is complete for the remediation/disposition effort, and post-remediation/disposition emergency planning has been initiated, if appropriate. This planning has been coordinated with on-site and external response organizations.

6.0 EM CDAT ELEMENTS/DEFINITIONS FOR D&D/DISPOSITION PROJECTS ACCOMPLISHED UNDER DOE OR NRC REGULATIONS (NOT UNDER CERCLA)

Table 6-1 2018 EM D&D Project Critical Decision Assessment Tool (CDAT) Critical Decision Assessment Tool - D&D Projects accomplished under DOE or NRC Regulations									
		Weighting Designation	Weighting Factor	D&D Studies, Characterization and Preliminary Analysis (CD-0 / ~1)		D&D Detail Investigation, Alternative Analysis, Selection and Plan (CD-1/2)		D&D Design and Remedial Action (CD-2/3)	
				Expected Maturity Value	Target Score	Expected Maturity Value	Target Score	Expected Maturity Value	Target Score
A. COST									
A1	Cost Estimate	H	7.5	1	7.5	2	15	5	37.5
A2	Cost Risk/Contingency Analysis	P	3	1	3	2	6	5	15
A3	Funding Requirements/Profile	H	7.5	1	7.5	2	15	5	37.5
A4	Independent Cost/Schedule Review	P	3	N/A	0	2	6	5	15
A5	Life Cycle Cost	P	3	1	3	2	6	5	15
A6	Forecast Cost at Completion	P	3	N/A	0	3	9	5	15
A7	Cost Estimate for Next Phase Work Scope	P	3	5	15	5	15	5	15
Subtotal Cost Element					36		72		150
B. SCHEDULE									
B1	Project Schedule	H	7.5	1	7.5	2	15	5	37.5
B2	Major Milestones	P	3	1	3	2	6	5	15
B3	Resource Loading	P	3	1	3	1	3	5	15
B4	Critical Path Management	H	7.5	1	7.5	1	7.5	5	37.5

B5	Schedule Risk/Contingency Analysis	P	3	1	3	1	3	5	15
B6	Forecast of Schedule at Completion	P	3	1	3	3	9	5	15
B7	Schedule for Next Phase Work Scope	P	3	5	15	5	15	5	15
Subtotal Schedule Element					42		59		150
C. SCOPE/ TECHNICAL									
C1	Alternative Analysis/End State	H	4.4	3	13.1	5	21.9	5	21.9
C2	End Point Criteria and Closure Plan/Permit Modification	H	4.4	2	8.8	4	17.5	5	21.9
C3	Functional and Performance Requirements	P	2.7	1	2.7	3	8.1	5	13.5
C4	Technology Needs Identified	P	2.7	3	8.1	5	13.5	5	13.5
C5	Technology Needs Demonstrated	P	2.7	2	5.4	4	10.8	5	13.5
C6	NEPA Documentation	H	4.4	2	8.8	4	17.5	5	21.9
C7	Plot Plan	P	2.7	2	5.4	4	10.8	5	13.5
C8	Site Characterization (Including Surveys and Soil Tests and radioactive inventory)	P	2.7	3	8.1	3	8.1	5	13.5
C9	Waste Acceptance Criteria (WAC)	P	2.7	1	2.7	3	8.1	5	13.5
C10	Waste Characterization and Disposition	H	4.4	1	4.4	3	13.1	5	21.9
C11	Pollution Prevention & Waste Minimization	P	2.7	2	5.4	3	8.1	5	13.5
C12	Waste Storage, Packaging and Transportation	H	4.4	2	8.8	3	13.1	5	21.9
C13	Equipment Needs	P	2.7	N/A	0.0	2	5.4	5	13.5
C14	Work Plans and Work Package Completion	H	4.4	N/A	0.0	1	4.4	5	21.9
C15	Interface Planning and Control	P	2.7	1	2.7	3	8.1	5	13.5
C16	Training Requirements	P	2.7	N/A	0.0	1	2.7	5	13.5

C17	Long Term Surveillance and Monitoring Plan/Post Disposition Monitoring Plan	P	2.7	N/A	0.0	2	5.4	5	13.5
C18	Permits, Licenses, and Regulatory Approvals	H	4.4	N/A	0.0	3	13.1	5	21.9
C19	Detailed D&D Design, Plans and Procedures	H	4.4	N/A	0.0	N/A	0.0	5	21.9
C20	D&D Design/Plans, Technical, and related Safety Reviews for this phase	P	2.7	N/A	0.0	5	13.5	5	13.5
C21	Natural Phenomena	P	2.7	2	5.4	3	8.1	5	13.5
Subtotal Scope/Technical					90		211		350
Element									
D. MANAGEMENT PLANNING AND CONTROL									
D1	Mission Need Statement	H	2.2	5	11.1	5	11.1	5	11.1
D2	Acquisition Strategy and Plan	H	2.2	3	6.7	5	11.1	5	11.1
D3	Key Project Assumptions	P	1.8	3	5.5	4	7.3	5	9.1
D4	Project Execution Plan (PEP)	H	2.2	1	2.2	3	6.7	5	11.1
D5	Integrated Project Team (IPT) and Charter	P	1.8	2	3.6	3	5.5	5	9.1
D6	Decommissioning Plan (For NRC work or DOE equiv.)	H	2.2	1	2.2	3	6.7	5	11.1
D7	Baseline Change Control	H	2.2	1	2.2	4	8.9	5	11.1
D8	Project Control	P	1.8	N/A	0.0	3	5.5	5	9.1
D9	Project Work Breakdown Structure (WBS)	P	1.8	1	1.8	4	7.3	5	9.1
D10	Resources Required (People/Material) for Next Phase	P	1.8	5	9.1	5	9.1	5	9.1
D11	Configuration Management	H	2.2	1	2.2	3	6.7	5	11.1

D12	Project Risk Management Plan/Assessment	H	2.2	2	4.4	3	6.7	5	11.1
D13	Quality Assurance Program	H	2.2	1	2.2	4	8.9	5	11.1
D14	Value Engineering, Trade-Off, and Optimization Studies	P	1.8	1	1.8	3	5.5	5	9.1
D15	Procurement Packages	P	1.8	N/A	0.0	1	1.8	5	9.1
D16	Project Acquisition Process	P	1.8	5	9.1	5	9.1	5	9.1
D17	Funds Management	P	1.8	5	9.1	5	9.1	5	9.1
D18	Project Reviews/Assessments	P	1.8	5	9.1	5	9.1	5	9.1
D19	Stakeholder Program	H	2.2	2	4.4	4	8.9	5	11.1
D20	Inter-Site and On-Site Coordination	P	1.8	2	3.6	3	5.5	5	9.1
Subtotal Management Planning and Control Element					91		150		200
E. SAFETY									
E1	Hazard Analysis/Safety Documentation	P	5	2	10	4	20	5	25
E2	Integrated Safeguards and Security Planning	P	5	1	5	4	20	5	25
E3	ES&H Management Planning (Including ISM)	H	15	2	30	4	60	5	75
E4	Emergency Preparedness	P	5	1	5	2	10	5	25
Subtotal Safety Element					50		110		150
TOTAL					308		602		1000

Table 6-2

2018 EM D&D Project Critical Decision Assessment Tool (CDAT)- For D&D accomplished under DOE or NRC Regulations (Non-CERCLA/RCRA) Project Definitions and Target Score Criteria

The following definitions describe the criteria required to achieve a maximum rating or maturity value of 5. It should be assumed that maturity values of 0-5 represent a subjective assessment of the quality of definition and/or the degree to which the end-state or maximum criteria have been met, or the product has been completed in accordance with the definition of maturity values.

A. COST		Rating Element			
A1	Cost Estimate	A cost estimate has been developed and formally approved by FPD and is the basis for the cost baselines. The cost estimate is a reasonable approximation of Total Project Costs (TPCs), and covers all phases of the project. The estimate is prepared in accordance with DOE requirements. The estimate bases are fully documented and traceable. Supporting backup information has been collected and organized and is available in a central file or location. Major estimate assumptions, especially those affecting major cost drivers, are fully documented and explained. Estimate exclusions or qualifications are clearly documented. Estimated costs are time-phased and escalated using current DOE or other justifiable escalation rates. For cost estimate point values AACEI Cost Recommended Practice 17R-97 is a useful reference. A Class I (CDAT score of 5) estimate is developed from quantity take offs from completed design plans and specifications. Whereas the Class 5 estimate (CDAT score 1) is of a rough order of magnitude estimate useful for determining the range of costs for various alternatives at CD-0.			
		Project Phase (DOE O 413.3B)	Level of Project Definition	Estimate Class	CDAT Maturity Value
		CD-0/Approve Mission Need	0% to 15%	Class 4/5	1
		CD-1/Approve Alternative Selection & Cost Range	10% to 15%	Class 3	2
		CD-2/Approve	30% to 70%	Class 2	3-4

		CD-3/Approve Start of Construction	50% to 100%	Class 1	5
Rating Element		Criteria for Maximum Rating			
A2	Cost Risk/Contingency Analysis	The cost estimate includes contingency allowances developed in accordance with DOE guidance. In addition to any deterministic contingency analyses that may have been developed, a probabilistic risk analysis has been performed. The assumptions, rationale and methodology used to perform the probabilistic analysis are explained. The cost risk analysis builds on and is tied to the Project Risk Management Plan. Risk mitigation costs, if appropriate, have been included in the baseline cost estimate, or addressed by the risk analysis model. Costs related to schedule contingency also are included. The use of management reserve by contractors in procurement actions has been evaluated. The confidence level of the baseline cost estimate is clearly stated and explained. All of the preceding requirements are documented in the project record.			
A3	Funding Requirements/Profile	Funding requirements have been defined and the project timeline is in compliance with the DOE budget timeline/process. Required budget documentation, including Project Data Sheets (where required), reflects current project cost and schedule estimates/forecasts. The funding profile is based on quantified resource requirements derived from the cost estimate, time-phased through integration with the project baseline schedule. Resource constraints (personnel, budget authorizations, etc.) have been considered when developing the project schedule, and an iterative process used to correlate the cost estimate, schedule and funding profile. The funding profile is based on full consideration of available or expected budget or funding levels for the project. The impact of any projected funding shortfalls has been assessed and management strategies developed to accommodate those shortfalls have been considered and incorporated in the project plans. All of the preceding requirements are documented in the project record.			
A4	Independent Cost/Schedule Review	In addition to any internal cost and schedule estimate reviews, the cost estimate and schedule have been subjected to an independent review by an organization not directly involved with the project (Independent Cost Estimate, when required). The independent review has been documented, including the techniques used and type of review performed. The results, findings and recommendations of the independent review have been reconciled with the cost and schedule estimates and changes have been incorporated.			

A5	Life Cycle Cost	The project Life Cycle Costs (LCC) includes relevant assumptions, bases of estimate, qualifications, and exclusions. LCC includes the estimated cost for government commitments that result from execution of this project, including downstream projects/facilities and eventual disposition of the facilities constructed for this project. The LCC estimate should meet the requirements of Office of Management and Budget directives and DOE Orders and guidance. LCC of competing projects or alternative strategies are estimated and documented on a comparable basis. For nuclear projects, or other projects with significant safety hazards, accidents mitigation costs associated with structures, systems, and components (SSCs) have been included. For high hazard facilities, safety mitigation costs are often a key discriminator in competing projects or alternatives.
A6	Forecast of Cost at Completion	The cost baseline is approved and the measurement of actual performance is begun, forecasts of costs at completion (actual costs to-date plus “to-go” costs) are developed and issued at regular intervals. Cost forecasts are developed in accordance with project procedures. Key assumptions supporting the baseline estimate are documented and periodically re-evaluated and the impacts of changing assumptions are reflected in the estimates of “to-go” costs. Forecasts are related to the Change Control system and incorporate both approved and pending changes, as appropriate. The forecast of cost at completion is a reasonable projection based on the status of the project and experience to-date.
A7	Cost Estimate for Next Phase of Work	A detailed cost estimate is prepared and approved for the work scope to be accomplished during the next phase of the project (i.e., the efforts needed to successfully complete the prerequisites for the next Critical Decision). Cost estimates are defensible with an appropriate level of supporting detail and documentation. Assumptions are clearly documented and stated.

B. SCHEDULE		Criteria for Maximum Rating
B1	Project Schedule	A schedule has been developed, documented and approved by DOE, is identified in regulatory milestones, and is the basis for the Schedule Baseline. The schedule is a reasonable layout of project activities for all phases of the project and is at a level of development that will allow project execution. Included project activities are consistent with the Work Breakdown Structure (WBS), and the schedule is prepared in accordance with DOE guidance and practices. The schedule is activity-based and includes milestones, reasonable durations and acceptable logic. Schedules and milestones should align after negotiations and change packages are complete. Lower level schedules are developed and tiered to support the baseline schedule and/or Project Master Schedule. Project-specific conditions are included. Assumptions are defined. Interface requirements (including technology development and Government Furnished Services and Items (GFSI) are incorporated into the schedule. The baseline schedule covers the full scope of the project through CD-4, including operations phases, if any. An appropriate method of developing the schedule is used, including an acceptable software package. The project schedule has undergone an independent documented check for completeness and accuracy.
B2	Major Milestones	Milestones are included at each level of the project schedule to establish a baseline and indicate significant progress against the work to be completed. Stakeholder and regulatory milestones are included, as appropriate. Milestones are tiered to support project decisions, performance, approvals, etc. A milestone dictionary is provided which defines the requirements for successful completion. An appropriate number of milestones are included to control the project.
B3	Resource Loading	The schedule is resource loaded, considers critical resources, and is consistent with the funding profile. The resource loading is documented, and is reasonable, considering such elements as ramp-up, lead times, constraints, etc.
B4	Critical Path Management	A Critical Path is defined. Near-Critical Path activities are identified and sensitivity analyses have been conducted. Schedule management practices are properly focused on Critical Path and Near-Critical Path activities.
B5	Schedule Risk/Contingency Analysis	A probabilistic risk assessment has been conducted on the baseline schedule, and appropriate contingency added, as required. Assumptions, rationale, and methodology, used in the analysis are documented. Schedule risks are fully integrated with the risk management plan.

B6	Forecast of Schedule Completion	The schedule baseline is approved and the measurement of actual performance has begun, forecasts of completion dates are developed and issued at regular intervals in addition to presentations of schedule progress. Schedule forecasts reflect actual performance, to date, and projections. Forecasts are related to the Change Control system and incorporate both approved and pending changes.
B7	Schedule for Next Phase of Work	A detailed schedule is approved for activities to be accomplished during the next phase of the project (i.e., the efforts needed to successfully complete the prerequisites for the next phase of D&D or the next Critical Decision). The schedule is defensible with an appropriate level of supporting detail and documentation.
C. SCOPE/TECHNICAL		Criteria for Maximum Rating
C1	Alternatives Analysis/End State	Major alternatives have been identified and viable alternatives have been analyzed. Alternative Analysis includes comparisons of LCC, Feasibility (including Technology Development requirements), Stakeholder Values, Safety, Regulatory Compliance, and other factors as appropriate. The preferred option(s) is identified and justified. The intended overall condition and status of the facility at project completion (end state) is established.
C2	End Point Criteria and Closure Plan/Permit Modification	End Point Criteria have been defined, documented and approved for facilities, spaces, systems, materials and wastes, consistent with meeting the established end state for the project. The Closure Plan for the release site or facility is documented and approved.
C3	Functional & Performance Requirements	Functional and performance requirements for the project are documented (approved by users and key stakeholders), and under configuration control.
C4	Technology Needs Identified and Available	Technology to be used has been identified and is currently available. The technology has been evaluated, including benefits and risks. If new technology is required, a technology development schedule supports the project schedule. Deployment of a new technology for the project should be part of the project risk assessment and is reflected in the project schedule and cost estimate.
C5	Technology Needs Demonstrated	New technology has been tested and determined to meet project objectives (technical, cost and schedule). Maturity of new technology to be used has been evaluated and factored into risk analysis. A Technology Readiness Assessment, or its equivalent (Reference: DOE G 413.3-4, Technology Readiness Assessment Guide, dated 10-12-09) has been conducted.
C6	NEPA Documentation	All NEPA activities, including NEPA strategy and requirements, are complete and compliant with DOE Orders, as necessary. (Not Applicable to projects conducted under CERCLA Regulations)

C7	Plot Plan	<p>Preliminary plot plan is complete and shows location of project in relation to adjoining facilities. It should include items such as:</p> <ul style="list-style-type: none"> Plant grid system with coordinates Unit limits Gates and fences off-site facilities Tank farms Roads and access ways Rail Facilities Green space Buildings Project boundaries Decontamination areas Temporary staging areas Major utilities - Nearby residences - Surface water
C8	Site/Facility Characterization (Including Surveys and Soil Tests) and radioactive inventory	<p>Assessment of site-specific requirements completed. Survey and soil test evaluations of proposed facilities/sites completed. Investigation and development of facility/site-specific characteristics sufficient to support final D&D planning/design and key assumptions are clearly documented. As applicable, radioactive inventory is complete, surveys have been conducted, soil and facility samples have been taken. Evaluation of the results of the investigation and characterization work has been finalized.</p>
C9	Waste Acceptance Criteria (WAC)	<p>The on-site or off-site Waste Acceptance Criteria are documented, approved, and included in the planning/design requirements for the project</p>
C10	Waste Characterization and Disposition	<p>Waste streams generated (gaseous, solid, and liquid, both hazardous and non-hazardous) through construction, demolition, or environmental cleanup are sufficiently characterized to identify appropriate disposition alternatives and worker protection levels and documented in a Waste Management Plan. Samples have been collected, analyzed and validated to produce reliable, high quality data. Necessary plans and actions have been taken to confirm conditions, prepare documents and perform the discovery action, including resolving surveillance and monitoring activities and safety considerations. Historical data and process knowledge are fully documented. All waste streams have their disposition finalized and included in the project costs, risks and schedule.</p>

C11	Pollution Prevention and Waste Minimization	<p>A detailed waste minimization/pollution prevention plan for the project, including any operational phases is complete. A description, estimated costs, and present implementation plan for design, operation, and mitigation features that will minimize wastes and prevent pollution are approved. A detailed waste management plan describing quantities and types of wastes to be generated and plans for their waste treatment, storage or disposal are complete. The plan should:</p> <ul style="list-style-type: none"> ▪ Support the waste management cost estimate for the cleanup and any processes. ▪ Identify project options for waste treatment, storage, and disposal, including availability of future disposal capacity and sites. ▪ Integrate waste management plans with waste minimization/pollution prevention plans. ▪ Characterize regulatory benefits and concerns associated with types and quantities of wastes expected.
C12	Waste Storage, Packaging and Transportation	<p>Storage, packaging and transportation requirements for nuclear and hazardous materials and wastes are identified and documented, including both off-site and in-plant transportation, as well as methods and equipment (casks, overpacks, etc.) for packaging, receiving/shipping materials (e.g., rail, truck, air, marine). The waste packaging and shipping requirements are identified, documented and included into the project design. Storage areas have required permits. Storage, packaging, and transportation specifications are fully identified for each waste stream.</p>
C13	Equipment Needs	<p>Equipment needs have been identified and procurement schedules established. All engineered equipment and/or materials are fully specified, bid, and tabulated as necessary to support project schedule.</p>
C14	Work Plans and work Package Completion	<p>Completed work plans and work package documentation including field instructions and requirements. Back-up files may include engineering files, trade-offs, calculations, etc.</p>
C15	Interface Planning and Control	<p>System interfaces (consistent with System Design Descriptions) have been identified and defined, and, if necessary, an Interface Control Plan is approved and implemented. All internal and external stakeholders have been involved in project development and planning. Appropriate ties to project logic have been accomplished for each stakeholder (i.e., material receipt, transportation, safeguards and security, safety, worker's health, regulatory, effect on current operations, etc.). The process should be part of the Worker Protection Program for DOE; 10 CFR 851, Worker Safety and Health Program; as they may apply and are appropriate.</p>
C16	Training Requirements	<p>Training requirements defined, planned and scheduled. Design considerations have been incorporated as appropriate. Simulation and/or mockup facilities are defined and established as necessary.</p>

C17	Long Term Surveillance and Monitoring Plan/Post Disposition Monitoring Plan	The draft Long Term Surveillance and Monitoring Plan is complete. This plan will be finalized and approved at the conclusion of remediation/construction. For D&D, the Post Disposition Monitoring Plan is prepared, approved, and ready for implementation by the performing organization
C18	Permits, Licenses, and Regulatory Approvals	Applicable permits, licenses, and regulatory approvals obtained and milestone dates for pending and new applications reviewed and revised as appropriate. All permits, licenses, and approvals necessary to deconstruct and operate a facility or to initiate and perform project activities are identified and will be obtained when needed to continue project execution on schedule. Schedule for receipt of authorization from regulators should be realistic based on experience.
C19	Detailed D&D Design, Plans and Procedures	<p>Project strategy and detailed planning addresses critical issues for transitioning from operations to disposition and from one disposition phase to another. At a minimum, the following issues are addressed.</p> <ul style="list-style-type: none"> - Technical and other options and alternatives selection - Disposition path for generated and residual radiological and hazardous materials - Interim storage needs - Goal for appropriate reduction of hazards and modification of the safety basis consistent with the project end-state - Identification of needed operational expertise - Project utilities and structural integrity during and post disposition - Integration of disposition tasks for attaining the end-points - Options and alternatives selection <p>Disposition path for generated and residual radiological and hazardous materials</p> <ul style="list-style-type: none"> - Interim storage needs - Goal for appropriate reduction of hazards and modification of the safety basis consistent with the project end-state - Identification of needed operational expertise - Project utilities and structural integrity during and post disposition - Integration of disposition tasks for attaining the end-points
C20	D&D Design/Plans, Technical, and Safety-related Reviews for this phase	D&D design, plans, technical and safety-related reviews have been conducted at each appropriate project phase. They have been performed by a team representing appropriate disciplines and, if appropriate, external experts have been utilized. Review results, comments and resolutions have been documented and accepted by reviewers. Safety issues have been resolved.

C21	Natural Phenomena	Seismic, Tornadoes, Hurricanes, Tropical Storms, seismic and other natural phenomena are considered in the remedy selection and remedial design, and are documented. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and be appropriate for D&D/restoration type projects.
D. MANAGEMENT PLANNING AND Criteria for Maximum Rating		
D1	Mission Need Statement (MNS)	An approved Mission Need Statement exists. The project MNS demonstrates that the project relates to and supports execution of Program Strategic Plan goals and objectives as well as the DOE Strategic Plan. A MNS describes regulatory or other requirements that are the basis for this cleanup project. Mission needs are reassessed after major changes in a program, at budget submission, and at Critical Decisions.
D2	Acquisition Strategy/Plan	An Acquisition Strategy/Plan has been developed and approved in accordance with DOE requirements and orders. The acquisition strategy and plans should be sufficient to accomplish the project using a tailored approach, as appropriate. The project is in compliance with the site/complex strategic plan. The approved Acquisition Strategy supports all contracts, subcontracts, long lead procurements, and major procurements (both foreign and domestic) for the project. The plan addresses the methodology of incorporating project specific issues [such as, nuclear quality assurance-1 (NQA-1)].
D3	Key Project Assumptions	A complete list of critical facts and circumstances that would affect project outcome if changed is available. These assumptions have been reviewed and approved by appropriate parties. Project assumptions are reflected in technical/cost/schedule baselines and risk management plans. The process should be part of the safety in design activities as defined by DOE STD 1189-2008, as they may apply and appropriate.

D4	Project Execution Plan (PEP)	<p>The PEP has been developed and approved in accordance with DOE requirements/orders. The PEP is the primary agreement on project planning and objectives between all parties, and establishes roles and responsibilities and defines how the project will be executed, including tailoring general requirements and processes to the specifics of the project. The PEP should include:</p> <ul style="list-style-type: none"> • Performance Baseline (Scope, Cost and Schedule), including a Resource Loaded Schedule for the duration of the project. • Identification of any long-lead equipment and materials (including the technical basis for equipment sizing as well as a risk analysis with respect to long-lead equipment being properly sized). • Project organization and roles and responsibilities. • Process for baseline change control and configuration management. • Project environmental and regulatory management • Project risk management plan (if not included as a separate document) • Discussion of planned design reviews and how they are to be conducted. • Project quality assurance organization and implementation approach. • Project closeout and project transition (if applicable.) <p>The PEP has been updated to reflect current project status, plans and performance baseline. -Note: The Preliminary Project Execution plan (PPEP) which is required at CD-1, should be based on a defined concept and, although not fully developed, is expected to contain substantial detail in all of the areas listed above. Thus a compliant PPEP would be rated at an expected maturity value of 3.</p>
D5	Integrated Project Team (IPT) and Charter	<p>The project organization and IPT charter are in place and functioning. The Integrated Project Team (IPT) has been in place since early project phases. The IPT participants' roles and responsibilities are clearly articulated. The composition of the IPT reflects the major areas of expertise needed to execute the project. The project is staffed with sufficient numbers of project management, technical, and acquisition specialists suitably qualified to accomplish project objectives. A qualified (certification level) Federal Project Director has been identified and formally assigned.</p> <p>- Note: The Preliminary Project Execution plan (PPEP) which is required at CD-1, should be based on a defined concept and, although not fully developed, is expected to contain substantial detail in all of the areas listed above. Thus a compliant PPEP would be rated at an expected maturity value of 3.</p>
D6	Decommissioning Plan (For NRC work or DOE equivalent)	<p>For D&D work being conducted under the regulatory authority of the Nuclear Regulatory Commission a Decommissioning Plan has been prepared and has been approved. For D&D work being accomplished under DOE D&D authority, similar D&D plans are in place and approved.</p>

D7	Baseline Change Control	There is a DOE approved process to review and approve proposed changes to cost, schedule, and technical baselines and to determine the impact of changes. Baseline Change Control Boards (CCB) are established at appropriate levels of the organization, the thresholds for each level are defined, and appropriate procedures are in place and being used. The process is described in the Project Execution Plan.
D8	Project Control	A project control system is being used to manage the project baseline applying earned value techniques, variance analysis, contingency/management reserve and effective reporting in accordance with DOE Orders and guidelines.
D9	Project Work Breakdown Structure (WBS)	A single Project Work Breakdown Structure is established which includes all authorized project work scope and reflects the project through project completion. WBS dictionary is complete, including detailed Statements of Work (SOWs). Project schedule and costs are directly aligned with the WBS structure, and deliverables are defined. The WBS is defined to an appropriate levels of detail needed to successfully manage the project.
D10	Resources Required (People/Material) for Next Phase	The resources required for next phase are identified and available. These resources are reflected in the resource-loaded schedule.
D11	Configuration Management	A configuration management program is functioning to ensure consistency among requirements, criteria, design, existing facilities, physical configuration, and interfaces within project documents. The process should be part of the Integrated Safety Management System.
D12	Project Risk Management Plan/Assessment	A risk management plan is developed and is included in the Acquisition Strategy/Plan and/or PEP, as appropriate. A risk mitigation strategy is in place. Project risk (technical and programmatic) is an accurate and complete estimate of the probability and severity of cost, schedule and other impacts (environment and safety) associated with uncertainties in the project, including a time-frame in which these risks are expected to occur. Risks are tracked, reported, and controlled. Project risks are reflected in the project cost estimate and schedule. Risk Mitigation Plans/Strategies have been identified in the plan and included in the Performance baseline. The process should be part of the Integrated Safety Management System.- Risk Management and Ownership continues to be actively used, as demonstrated by periodic (i.e. at least quarterly) updates of the risk register and regular reporting and re-evaluation and status reporting of cost and schedule contingency.

D13	Quality Assurance Program	A quality management system is defined and integrated into the processes governing activities that implement the project mission in compliance with requirements of 10CFR 830 Subpart A, Quality Assurance Requirements, DOE O 414.1C, Quality Assurance, and other applicable project specific quality requirements. A Quality Assurance (QA) program/plan is established. QA factors, including standards, specifications, and limitations are identified and have been communicated to the project staff and contractors. A Quality Control (QC) and QA oversight organization is in place and functioning. The process should be part of the Integrated Safety Management System.
D14	Value Engineering, Trade-Off, and Optimization Studies	Where appropriate, a value engineering program complying with DOE Orders is in place and qualified personnel have analyzed appropriate project functions using accepted industry techniques with the aim of improving performance, reliability, quality, safety and life cycle costs of remediation technologies, systems or procedures. The value engineering analyses are documented in a formal report and have provided unbiased, outside opinion and/or senior expertise (as appropriate) as inputs to the D&D planning/ design process and an independent review of concept, design, and schedule. Measures, taken to minimize project life cycle costs and maximize the return on investment for completing the project, have been documented and cost savings have been quantified. Project criteria have been re-evaluated when value engineering analyses have determined them to have poor value or a high cost-to-worth ratio. The Trade-Off Studies are performed, as needed, to reach a reasonable level of project risk consistent with project phase and overall project cost/schedule. These trade-off studies are a part of conceptual and later design/planning phases to optimize the implementation design of the selected alternative. The studies include alternative requirements and controls, and optimization approaches with consideration of technical and safety requirements. The studies conducted should be well documented and the conclusions justified.
D15	Procurement Packages	Procurement packages are being developed in accordance with the Acquisition Plan and will have added details for Design-Build procurements (if appropriate). Contractor selection processes and procedures are in place. Procurement packages reflect all requirements for security, safety and environmental considerations and pass on appropriate responsibilities and risks to contractors and subcontractors.
D16	Project Acquisition Process	The project is being accomplished in accordance with the established DOE Project Acquisition Process and in compliance with DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets, including Critical Decisions and Energy System Acquisition Advisory Boards (ESAAB) or the ESAAB-equivalent process.

D17	Funds Management	A funds management system is in place to ensure funds are allocated to support the project baseline elements for the current fiscal year. A system is in place to periodically review the annual costs to ensure that the annual funding will not be exceeded.
D18	Reviews/Assessments	Reviews (including External Independent Reviews (EIRs), Independent Project Reviews (IPRs) and Technical-IPRs) and assessments are performed and the findings, assessments, and recommendations are documented and presented to appropriate levels of management. A Corrective Action Plan is in place and being monitored and implemented, as necessary. Appropriate reviews and self-assessments are conducted as an integral part of the project, based on project complexity, size, duration and Critical Decision points.
D19	Stakeholder Program	A stakeholder program was established early in the planning phase of the project to take into account the concerns and ideas of Federal, state and local regulators, local citizens, the project staff, the laboratory, DOE' site office, the Program Office, and other entities involved in the planning, design, or implementation of the project. The stakeholder program includes a mechanism for incorporating stakeholder feedback into the planning process and for communication between the project team and stakeholders in a timely and meaningful way.
D20	Inter-Site and On-Site Coordination	Key inter-site and on-site coordination issues are identified, addressed and resolved or plans are in place to accomplish their resolution.

E. SAFETY AND SECURITY		Criteria for Maximum Rating
E1	Hazard Analysis/Safety Documentation	<p>Addressing hazards early ensures that safety is “designed in” early instead of “added on” later with increased cost and decreased effectiveness. Hazards include both project hazards (such as fire hazards, criticality, radiological, chemical, and explosives), as well Natural Phenomena Hazards such as earthquakes, flood, hurricanes, and lightening. Analysis of hazards results in the identification of potential accident scenarios and the determination of how to prevent or mitigate the accidents. Structures, systems, and components (SSCs) are identified and incorporated into the remedial design to prevent or mitigate the consequences of hazards to the cleanup, facility worker, the collocated worker and the public.</p> <p>Requirements on the Integrated Safety Management System (ISMS) to be followed are described in DOE P 450.4, Safety Management Policy, dated 10-15-96. New nuclear facility design activities or major facility modifications as defined in 10CFR 830, Subpart B, -must be conducted in accordance with DOE O 420.1B, Facility Safety, dated 12-22-05; DOE STD 1189-2008; and 10 CFR 851.</p> <p>The ISMS process is applied to all Critical Decisions (CDs) and the Office of Health, Safety and Security (HSS) activities and documentation (among others as applicable and appropriate) that should be followed by the project are described below:</p> <p><u>Prior to CD-2/3:</u></p> <ul style="list-style-type: none"> • Inventory of available documents based on existing facilities/sites identified in the scope of the project to facilitate hazard analysis and project planning. • Identify the potential hazards and their safety and risk implications in the mission need statement or RI/FS. • Include in the mission need DOE expectations for safety in design; identification of Safety in Design Tailoring Strategy; and identification of high level applicable safety regulations, safety codes, and safety standards (e.g. DOE O 420.1B, etc.).

E1	Hazard Analysis/Safety Documentation (continued)	<p><u>CD-0 to CD-1 (Alternative Selection and Cost Range:</u></p> <ul style="list-style-type: none"> • Hazardous conditions and associated likelihoods and consequences, both mitigated and unmitigated for each reasonable alternative are documented. Hazards have been identified for control under safety management programs (Integrated Safety Management System, industrial safety, radiation protection, etc.). • Development of a Safety Design Strategy, • SSCs that prevent or mitigate the frequency and/or consequences of DBAs associated with project hazards and natural phenomena hazards (NPH) are identified. • Requirements for worker safety, radiation safety, criticality safety, fire safety, industrial safety, and life safety are identified and incorporated into the project Facility and Operational Requirements, and design criteria documentation. • Determine the qualified safety and health professionals in the Integrated Project Team necessary to support the Federal Project Director. <p><u>CD-2 to CD-3 (Performance Baseline):</u></p> <p>Safety analysis activities that may be required should be integrated and performed concurrently and iteratively with D&D planning/design activities in order to establish an accurate and defensible performance baseline that adequately incorporates nuclear safety basis requirements, as applicable. Safety basis documents that are developed for CD-2/3 are:</p> <ul style="list-style-type: none"> • Updated Safety Plan - that demonstrates how an adequate safety plan is maintained on a step by step basis as the process of deactivation and dismantlement proceeds • Requirement for worker safety, radiation safety (including ALARA), criticality safety, industrial safety, fire safety, life safety, and chemical safety identified and incorporated into the project design. • Hazard Analysis Report has been updated, reviewed and approved if required. <u>CD-2 to CD-3:</u> • The Integrated Safety Management Process has been validated for D&D/remediation activities.
E2	Integrated Safeguards & Security Planning	<p>The security approach and potential requirements for the project are documented to aid in the development of the integrated safeguard and security plan. Safeguard and security requirements are identified and documented and incorporated into D&D planning/design drawings, plans and specifications. Security levels are appropriate for the designation of the facility as nuclear or non-nuclear. Full consideration is given to the security of both the facility as well as the components as deactivation and dismantlement activities take place.</p>

E3	ES&H Management Planning (Including ISM)	Environmental, safety and health requirements, as delineated in Federal, DOE, state, site and local laws and regulations, are included in the project design requirements. Any exceptions are documented, justified and approved. The requirements, methodology, and responsibility for ES&H activities are clearly communicated. An Integrated Safety Management System (ISMS) has been implemented in support of the project in accordance with the requirements of DEAR 970-5204-2. The site's ISMS Document includes mechanisms for integrating ISM into the project activities and these mechanisms have been implemented. Safety Plans include fire, occupational, radiological, industrial hygiene, etc., and are complete, thorough and an integral part of all D&D planning/design, deactivation and dismantlement efforts. Site procedures and mechanisms ensure that during the project planning, hazards are analyzed, controls are identified, and feedback and improvement programs are in place and effective. Line managers are using these processes effectively, consistent with their management functions, responsibilities and authorities.
E4	Emergency Preparedness	Emergency management considerations are adequately reflected in the project planning and design and meet emergency preparedness requirements of DOE O 151.1D, <i>Comprehensive Emergency Management System</i> , and DOE O 420.1C, <i>Facility Safety</i> , where appropriate. Emergency response services and related factors are considered for the remedial/D&D site location. Specialized issues and considerations for emergency preparedness are adequately identified and documented. Preparedness planning is complete for the disposition effort, and post-disposition emergency planning has been initiated, if appropriate. This planning has been coordinated with site and external response organizations. Specialized issues and considerations (e.g., control of interrelated processes) for emergency management are adequately identified and documented. Planning is complete for the remediation/disposition effort, and post-remediation/disposition emergency planning has been initiated, if appropriate. This planning has been coordinated with on-site and external response organizations.

APPENDIX A

EM CDAT SPREADSHEETS

- Non-Excel (i.e., Word) versions of the spreadsheets are contained in the previous sections.
- You cannot perform the necessary automated calculations necessary to obtain scores, subtotals and grand total with the non-Excel version contained in this manual. To access the “working” Excel tool see the note below.
- One can also obtain electronic versions of the Spreadsheets from EM-5.22.

NOTE:

Appendix A The actual Excel-based tool itself is an editable document [*designed to allow for incorporating live information with ability to save outside of this manual*], and is provided as an attachment to this PDF document. To view the tool, click on the paper clip icon to the left.

