



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
SCIENCE

Project Scope Definition:

a. Spares

FPD Forum
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Office of Project Assessment
Office of Science, U.S. Department of Energy

In recent months, OPA has held discussions to ensure consistent guidance for the broad topic of **project scope definition**. The following subtopics have been raised:

- Scope Definition
- Baseline to Threshold KPPs or Objective KPPs
- Definition of “fully functional”
- Change Control
- **Spares**
- Scope enhancements post CD-2
- Verification of KPPs being satisfied
- Declaring project completion
- Funds remaining post CD-4

Spares was chosen for 2 reasons:

- 1) Significant interest during OPA internal discussions
- 2) SC Programs requesting guidance

- Overview
- High-level Guidance
- Spares Plan
- Selecting Spares
- Spare Classification
- Lifetime of a facility/equipment
- Limitations
- Accounting
- Critical Decisions
- Summary
- Discussion

Objective: To provide guidance for spares with the use of project funds.

- The following personnel were consulted:
 - OPA staff
 - Program managers
 - Federal project directors
 - M&O project managers
 - SC budget
 - DOE Office of the Chief Financial Officer
- This should not inhibit a project/program from considering other options and creative legal solutions.
- Questions and discussion are highly encouraged
- This presentation will be updated posted on the OPA webpage



Spare: is a consumable or unique component that is necessary during fabrication, construction, commissioning, start up, and operations.

OPA suggests the following for spares purchased with project funds:

- Consider if a **spares plan** is beneficial
- Ensure spares are **reasonable and justifiable**
 - Not intended to create an inventory
- Ensure there are **sufficient spares for commissioning, start-up, and early ops.**
- **Prioritize spares by criticality and risk**
- Use the **appropriate funding** (i.e. TEC or OPC) to purchase spares (or operation funds)
- Associated funds should be committed by CD-4.

- Is a summary of how the project team will handle spares
- An agreement between the program, project team, and host institution regarding the expectations for the project (maybe operations too)
- The decision to develop a plan is independent of TPC (program discretion)
- Alternative documents maybe be sufficient
 - Key assumptions document
 - Transition to operations
 - MOU
- The level of detail should be dependent on
 - Project type (e.g. detector upgrade vs new accelerator)
 - Project complexity
 - Number of spares considered
 - Project size



- The plan should justify:
 - Why spares need to be purchased (consumable, unique, etc.)
 - When to purchase (decision dates)
 - Rational for how spares will be prioritized and selected

- The plan should identify:
 - Spares purchased as base scope vs. contingency
 - Funding source
 - TEC vs OPC funds
 - Purchased off-project with operation funds (power supplies)

- The plan should (general):
 - Allow for flexibility (e.g. scope enhancements, number of spares, etc.)
 - Be a living document
 - Minimize creating duplicate information (i.e. PEP, Trans to Ops., etc.)

- Consider identifying:
 - Selection process
 - Change Control process
 - Roles and Responsibilities
 - Program
 - FPD
 - Host Institution
 - Identifying ownership of spares

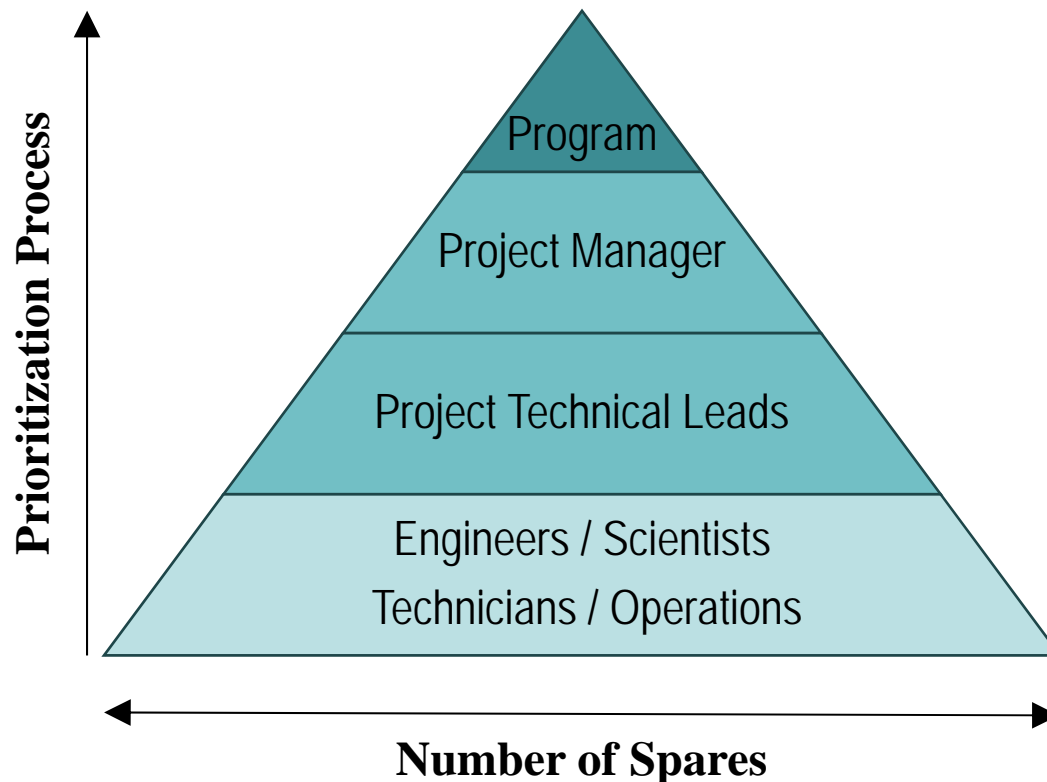
- Consider summarizing:
 - Verification and testing requirements
 - Contractual strategies on:
 - How to down select vendors
 - Transition vendors from prototyping to production components to spare components



Selecting Spares

(1 of 3)

- Prioritize spares based on
 - Risk (e.g. infant mortality, radiation effects, downtime, etc.)
 - Criticality (e.g. unique single point of failure)
- Conduct a bottom-up risk assessment.





➤ Consider:

- Practices regarding spares of a host institution
- Spares needed to achieve CD-4
- Cost and time needed to acquire spares
 - Recreation of a production line
 - Lead time to purchase during operations (especially in the first year of ops)
- Availability of spares in the future
 - Unique component (detector parts for STAR @ RHIC, built in 2000)
 - Change in technology in the future (NSLS-II)
- Lifecycle (e.g. prototyping, component verifications/validation testing, commissioning, operations, etc.)

Questions to consider:

- Will there be a knowledge loss in the future on how to fabricate the spare?
- What is the cost of a spare on-project vs. cost of downtime (including lost research)?
- Are economies of scale realized by purchasing on-project vs. later during operations?
- Is the importance of batch uniformity important (example: NOvA – 2% additional PVC extrusions)?
- Is there a risk that technology evolution and compatibility will affect the ability to acquire a replacement in the future?



Project Spare: Is required on-project, including start-up and commissioning.

- Expect to fail or reach end of design life prior to CD-4
- High rate infant mortality (e.g. HFT ladders, which lost ~10%)
- Likely to not meet spec during installation (e.g. electronic boards)
- “Waste Spares” (i.e. require over production)
- **Examples:**
 - LSST: sensors that don’t meet the highest spec.
 - NOvA: Ceramic tubes inside kicker magnets
 - NOvA: purchase extra suction cups for a modular lifting structure
 - Components for tooling and fixtures needed for production
 - Beam instrumentation for alignment monitoring
- **DOE G. 430.1-1:** “initial spares”



Critical Spare: Is a unique component that does not require routine replacement during operations, but is necessary to be in stock for continuity of operations.

- Single point of failure
- Not available in the future
- Not a consumable
- Often a economical justification (see “economical spare”)
- Unique component (e.g. requires a special production line)
- Justifiable use of contingency
- “Special Process Spares” (e.g. sc accelerator magnet)
- **Examples:**
 - Accelerator magnets
 - NOvA Accelerator RF cavity.
 - Transformer: 13KV to 480V
 - Internet search: “Special Process Spare” (FermiLab Doc #: 12.PM-002.DT-02)
- **DOE G. 430.1-1:** “spares parts inventory”



Operational Spare: Is routinely replaced post-project as a part of early operations and regular maintenance during operations:

- High rate of failure
- Have a limited design life
- Not required for project completion
- Not a project requirement, but a limited amount can be purchased with contingency
- **Examples:**
 - LBNF - “Horns” focus particles in a high radiation environment and require replacement every 6 months. (Similar: HFT with PXL)
- **DOE G. 430.1-1:** “spares parts inventory”

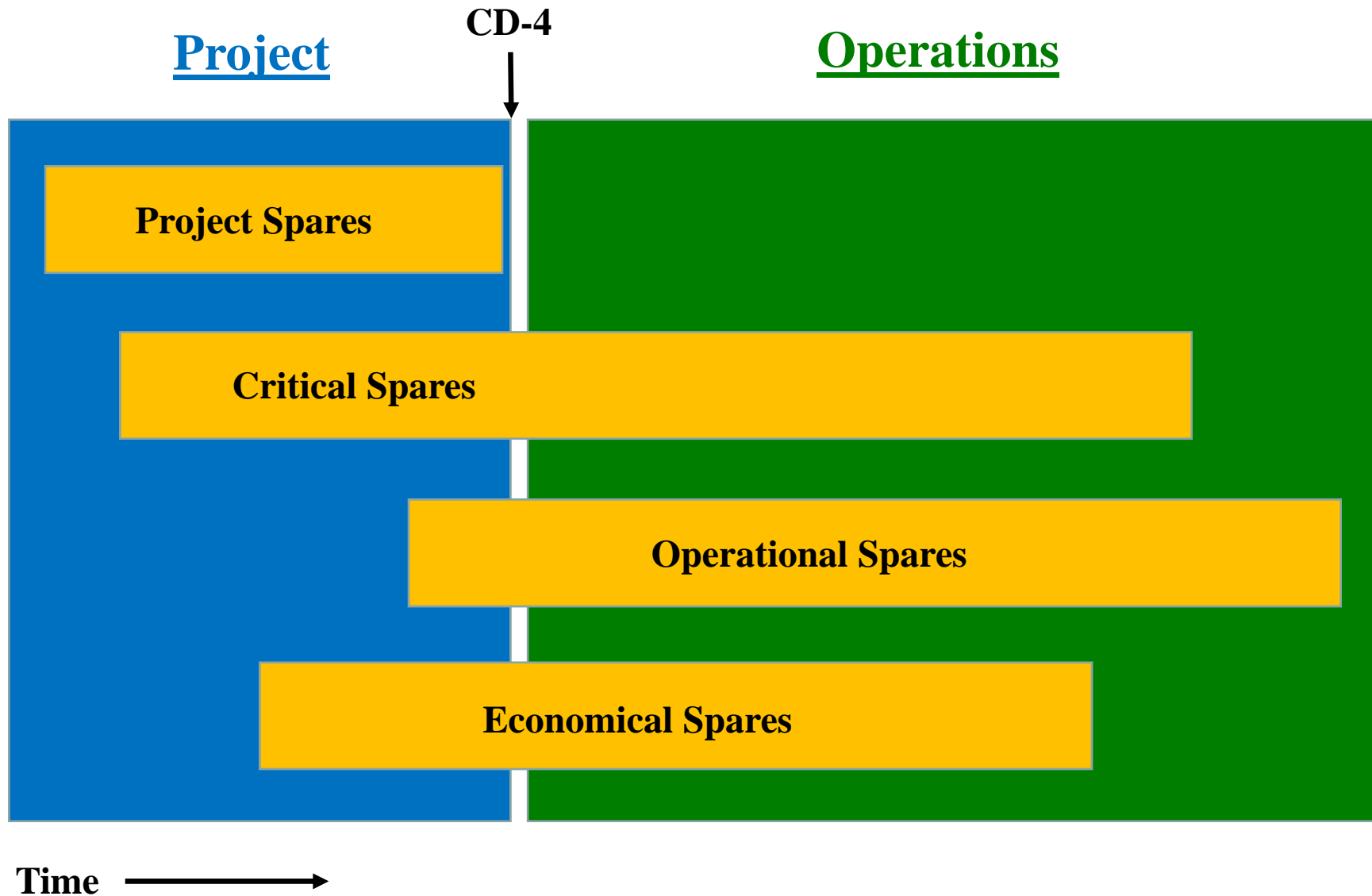


Economical Spare: Is economically justifiable to purchase with project spares or operational spares due to economies of scale, future costs, etc.

- Batch uniformity
 - Precision over accuracy
- Production overages
 - High failure rate
 - Costs (increase QA cost for a small batch)
 - Unique component (saves production cost in future)
- Unknown infant mortality
- These fit into any of the other definitions of spares
- **Examples:**
 - Conventional construction – ceramic tiles
- **DOE G. 430.1-1:** “spares parts inventory”



Lifetime of a facility/equipment





Guidance: OPA can not find any legal limitation regarding the purchasing of spares with project dollars; however, ensure the use of appropriate funds (slide:18-19) and the spares are reasonable and justifiable. Be aware of the following:

- **CD-4:** A Spare purchased with project funds should be **committed by CD-4**.
 - Note:
 - Delivery and acceptance of spares is the decision of the Program
 - Spares can be justified as a project closeout activity (See Backup Slide 24)
 - The associated TEC funds can be reallocated to OPC, Operating Expense, or Operations up to \$5M or 10% of the total TEC, whichever is lower. (See Backup Slide 25).
- **Accounting:** ensure the appropriate funds (TEC or OPC or operations) are used (slides:18-19)

Question: Should spares be purchased with TEC or OPC dollars?

Answer: OPC funds is ideal since reprogramming is allowed; however, if it a spare is used on project (i.e. placed into service*) then TEC is required.

Total Estimate of Cost (TEC)

- Project Spares (i.e. “initial spares”)
- Components placed into service
- Prototypes converted and placed into service
- Include cost of installation

Other Project Costs (OPC)

- Operational, Critical, and Economical spares (i.e. “spare parts inventory”)
 - unless placed into service
- Prototypes
- R&D
- Commissioning and start-up

**See DOE Financial Management Handbook, Chapter 10 Accounting for Property, Plant, and Equipment (PP&E), Page 10-21.*

6-10

DOE G 430.1-1
03-28-97

TABLE 6-1

**TPC AND TEC GUIDANCE AND CLARIFICATION
INCLUSION OF DETAILED ACTIVITIES IN TPC AND/OR TEC**

ACTIVITY	TPC				
	OPC	TEC			
		ED&I	P M	CM	CC
T. Quality Control (QC) Inspection			X	X	X
U. Inspection and Acceptance		X		X	
V. Negotiations of Fixed Price Contract Changes			X	X	
W. Trips to Vendor/Fabricators		X	X	X	X
X. Procurement Coordination			X	X	X
Y. Equipment/Hardware Cost				X	X
Z. Material Procurement Rate				X	X
AA. Initial Office Furniture and Fixtures					X
AB. Spare Parts Inventory	X				
AC. Installation/Alterations					X
AD. Disposal of Mixed Waste					X
AE. Cost Plus Award Fee/Fixed Price Construction		X			X
AF. Plant Forces Work					X
AG. Initial Spares					X
AH. Safety Plan & Overview				X	X
AI. Decontamination (exceeds normal operating levels)	X				
AJ. Decontamination (as removal cost)					X
AK. Surveying to Support Construction			X	X	X
AL. Interest Penalties		X	X	X	X

➤ Table 6-1 from the *DOE Cost Estimating Guide, 430.1-1, Chp 6, Project Functions and Activities Definitions for Total Project Cost. This has been archived.* However, the accounting rules for spares is still the standard that is used.

Link: <https://www.directives.doe.gov/directives-documents/400-series/0430.1-EGuide-1-Chp06>

➤ The **current** DOE cost estimating guide is: DOE G 413.3-21 Chg 1, which does not include this table, but per section 6.7.2 gives the program offices the discretion for cost classification.

Link: <https://www.directives.doe.gov/directives-documents/400-series/0413.3-EGuide-21-admchg1>



Pre-CD-2

- Begin identifying potential spares
- Contact peers for lessons learned
- Begin prioritizing spares
- Discuss with the program office

CD-2

- “Must buys” are included in the baseline at CD-2
- Identify potential spares to be purchased with contingency.

CD-3

- Develop a risk-based contingency spenddown plan with costs and decision dates.
- Purchase and/or refine based on a continual risk assessment.

CD-4

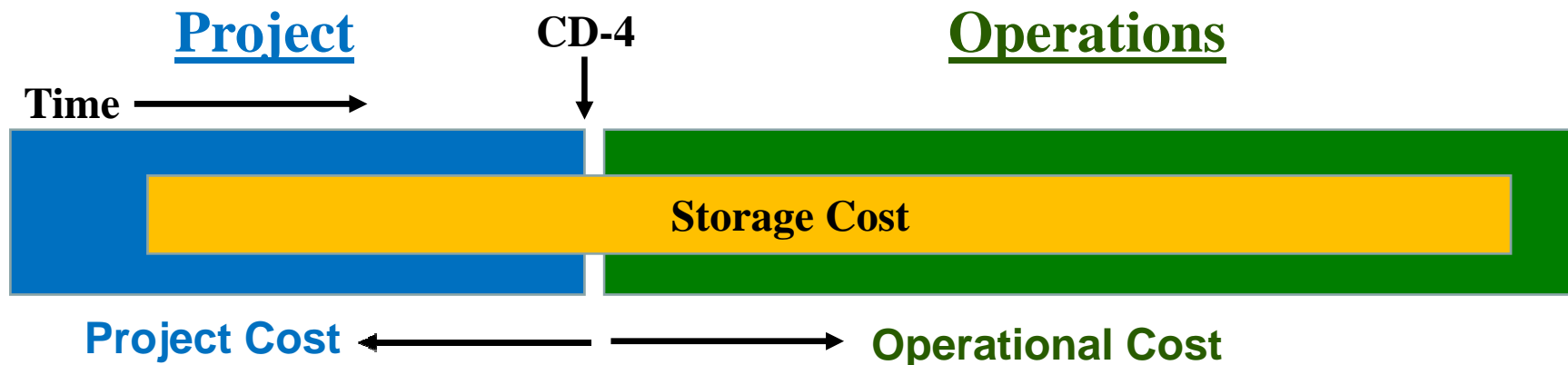
- Explain in the Transition to Operations Plan how spares will be used

- Spares are consumables or unique components that are necessary for fabrication, commissioning, start up, and operations.
- 4 classification
 - Project Spare
 - Critical Spare
 - Operational Spare
 - Economical Spare
- Ensure spares are reasonable and justifiable
- Consider a spares plan to support the selection
- Ensure there are sufficient spares for commissioning, start-up, and early ops.
- Ensure the appropriate funds (TEC or OPC)
- Associated funds should be **committed** for by **CD-4**.



Question: Does the associated storage cost for the spare have to included in the project cost

Answer: That depends on when the storage occurs. If the spares are purchased early in the project, the cost of storage would be part of the project cost until the project ends. If the storage continues beyond the project, the cost would be paid by operations.





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BACK UP SLIDES

Q: TPC funds can be used for Project Closeout activities; however, there are circumstances where the situation is not clear. Can you provide more details on what costs are allowed for Project Closeout and what costs are not? For example, what if the project has met the KPPs, but has placed a contract for items before CD-4, but not delivered or paid until after CD-4?

A: *The following examples are considered Project Closeout costs and can use TPC for these items after CD-4.*

- *Performance/Quality Assurance Closeout such as completing punch list items, collecting and archiving project documents (QA, change controls, Project Execution Plans, etc.)*
- *Financial Closeout such as ensuring all expenditures are accounted for and reconciled, and all expenditures are paid including settling any contract claims or legal liabilities.*
- *Contract Closeout including providing a formal written notice of terminating or completing a contract. See also Financial Closeout above.*
- *Equipment Disposition and Transfer—deposition or return of equipment or facilities (may include cost of cleaning/repairing equipment or facilities to original state).*
- *Capturing Lessons Learned and drafting the Project Closeout Report.*
- *Data Archiving—cost of collecting and archiving project documents and data.*
- *Administrative Closeout—cost of performing all activities listed above and transferring any staff off the projects, completing personnel paperwork such as performance appraisals, etc.*

Even with the examples and guidance above, there may still be instances where the situation may remain unclear, such as the purchase of items prior to CD-4, but delivery and payment after CD-4. For OPA, the decision on what is allowable or not would depend on the amount of funds being spent after CD-4. Spending TPC funds outside of CD-4 date (with the exception of closeout activities) appears questionable and OPA would consider the purchase example above not allowable. If confusion remains, OPA recommends the following:

- *If the fund is MIE or OPC, HQ should transfer the money to Operating Expense through the Work Authorization System.*
- *If the remaining funds are TEC, the remaining contingency may be returned or reprogrammed. See next page.*

The project need to make sure that there is sufficient fund to cover these costs and that project TPC is not exceeded.

INFO FROM: OPA FAQ, slide 38. July 27, 2015

Q: Someone from NNSA told me that DOE and the programs are allowed internal reprogramming (thus flexibility to move) some project funds—it that true? What does that mean?

Yes, it is true. Annual Congressional funding appropriation bill usually include definitions and guidelines on reprogramming. For example, the FY15 budget bill (Energy and Water Development Appropriations Bill, 2015—page 93 And 94) allowed “reallocation of funds from one construction project to another or change \$2,000,000 or 10 percent, whichever is less, in the scope of the approved project.”

For non-construction project funds, the department can move \$5M or 10%, whichever is lower of the table (detailing budget information) to congress.

What this means is that programs don't necessarily have to return TEC money to treasury—the funds can be converted to OPC and can be used for O&M, spares, or other activities.

INFO FROM: OPA FAQ, Slide 39. July 27, 2015).