A Discussion of Contract Types and the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) at the Savannah River Site.docx
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[Sub-Contractor Names Redacted]

BY:

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Executive Summary

The Federal Acquisition Regulation (FAR) and Department of Energy Acquisition Regulation Supplement (DEARS) guide the Department of Energy at the MOX Fuel Fabrication Facility (MFFF). These provisions, where applicable, also guide all subcontracts issued by MOX Services. There are two main categories of Government contract types discussed in the FAR and DEARS: Fixed Price and Cost Reimbursement. Fixed price contracts that cannot be priced at the outset can easily be eliminated from consideration for projects that do not have reasonably defined or definite scopes of work. Cost reimbursement contracts are the only type of contracts that can be considered for unknown work effort, quantity, or definition. A subset of the cost reimbursement contract commonly used in construction contracts is the Time-and-Materials (T&M) contract. The T&M contract is especially useful in research and development, or for unique functional nuclear structures or products that utilize a high proportion of engineering design services. Based on a recent Request of Interest (EOI) for an upcoming $80,000,000.00 Heating Ventilation and Air Conditioning (HVAC) award, subcontractors agree (See PG 5).

The MFFF is being built as a first-of-its-kind facility; France has two functional facilities, one of which is still being utilized. France’s facilities, though, were not built under NQA-1 quality standards or United States’ regulations. Given France’s success with building similar facilities, though, there should be no question that the MFFF can be successfully built, and functional. To that end, the Savannah River Site MFFF is being built to NQA-1 quality standards. The MFFF must also meet multiple functional standards, while also successfully implementing multiple interdependent functional systems, e.g. HVAC is required to maintain a negative air pressure system that works in conjunction with reinforced rebar and concrete walls, fire suppression, and electrical systems as a first line of defense against radiation escape and injury. The quality standards and intricacy of the MFFF create an inability to predetermine scope and cost of work for selected areas of effort, such as HVAC, electrical, pipe support installation, and process equipment installation. T&M contracting at the MFFF project is the only contract vehicle that makes sense in these selected instances.

The Department of Energy (DOE) is flexible enough to allow for T&M contracting in construction of the MFFF. The DOE states, “[t]he goal [in contract selection] is to select the contract type that will result in the most optimum business arrangement between the parties” at the MFFF. In order to be least costly to taxpayers, and to deliver the MFFF “at the earliest practicable date,” the MFFF also needs to use DOE’s flexibility. As eluded to above, and detailed herein, the MFFF is an NQA-1 project of the highest technicality and complexity. The MFFF continuously has multiple scheduling iterations and numerous engineering and design input/change revisions. Because of this, and although the MOX Services Procurement Department is responsible for selecting the appropriate contract type, those who write the Statement of Work (SOW) packages are most familiar with the technical requirements and degree of uncertainties and create the most critical component for the Procurement Department in selecting contract type; it is what technical personnel have put together that leads MFFF subcontracting to require utilization of T&M procedures for selected contracts. At the time of executing these selected T&M contracts, no other contract type can serve the purpose of getting MFFF needs fulfilled. Not only that, but T&M

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2 DE-AC02-99CH10888, Mod No. 243, Part I, Section C (hereafter referred to as the “Prime Contract”).
contracts allow selected MFFF contracts the flexibility to most optimally use the work-force at hand, while also taking advantage of the focused technical expertise required to complete one of the United States most complex structures currently under construction. In fact, this scenario has been proven as per the DOE’s Inspector General’s (IG) contract evaluation of T&M vs. FFP. The IG conducted an extensive comparison of MFFF firm fixed price (FFP) and T&M contracts as used in civil work, concluding that the price per cubic yard of concrete installed at the MFFF was actually cheaper under T&M methodologies after the amount of change orders required for FFP execution was considered.

The following pages will contain an analysis that leads to the conclusion that using T&M contracting on selected MFFF contracts will most optimally achieve and fulfill the mission of MFFF completion. To summarize, this document will initially map the conclusion that firm-fixed-price contracts ask MFFF contractors to assume too much of the risk involved in the uncertainties discussed herein. All guiding principles in Government contracting assert that the Government should assume a greater degree of risk for a project as complex and uncertain as the MFFF nuclear project. Undoubtedly, it is due to all of the complexity related to maintaining American Society of Mechanical Engineers (AMSE) NQA-1 (Nuclear Quality Assurance-1) standards, enforced by both NNSA and U.S.NRC, that compliance thereto inherently creates additional complexity, technicality, and time delays related to a multitude design aspects. For these reasons, most of the contracts relating to a substantial amount of major aspects of work at the MFFF require the exclusion of fixed price contracting. It is noted, however, that MOX Services will continue to make use of fixed price contracts to the maximum extent practicable. This will especially be true with DOE as a contracting advocate to MOX Services project execution.

Some of the cited aspects of the NQA-1 standards that push out fixed priced contracting include the Quality Assurance Program, maintaining organization and design control, including ensuring appropriate control and tracking of quality and qualified materials and their arrival, being able to track change orders and changing design sets in conjunction with those compliant materials, along with their commensurate interference creating activities related to inspecting, testing, record keeping, corrective actions, and audit controls. In addition, execution of fixed price NQA-1 contracts would create additional time delay and cost to the construction of the MFFF; e.g., change order negotiation and stoppage of work pending change order approval and issuance. The construction of the MFFF nuclear facility simply does not mesh with fixed price contracting.

Next, a mapping of why cost-reimbursement contracting is not appropriate for the major components selected for T&M contracts will ensue. Cost reimbursement contracting, given the expected size of the subcontracts selected for T&M, will require subcontractors to have Cost Accounting System (CAS) compliant systems. Most construction firms that have existing CAS systems (e.g. Fluor, Bechtel, and CH2M Hill) will not bid as a subcontractor to another Government Prime Contractor for work in the selected T&M projected cost range. Firms that will bid in this range usually do not have compliant CAS systems (e.g., ASubKtor, SSubKtor, and YSubKtor). In addition, substantial risk to the project schedule and DOE would be created by having smaller companies attempt to set up CAS compliant systems from the ground up in support of MOX Services work. The project would also then be tied to the substantially delayed and overworked Defense Contract Audit Agency (DCAA). Not only that, but CR contracting will create more delays than T&M contracting, and also cost the taxpayer more in the end (just like the above cited IG’s evaluation of FFP vs. T&M concluded).
Time-and-Materials contracts do meet MFFF requirements for selected construction components. Of prime importance is that T&M contracting can inherently deal with delays and unknowns. Citing responses from the only two (2) subcontractors that expressed interest in the above referenced $80 million dollar HVAC contract:

1. A T&M contract “[b]ased on the description [of the contract to be awarded], it appears that the MFFF is of size and complexity that makes it extremely difficult to adequately define the scope and duration with any reasonable accuracy. Time and Materials contracts are best suited for these circumstances. We believe this contract type allows us to better align with the goals of our customers because the focus becomes working together rather than contract compliant risk management. With this arrangement we can provide better leadership through responsible & innovative solutions.”

2. **NOTING THIS IS AN EXPERIENCED, CAS COVERED CONTRACTOR.** Time and Material – Based on our experience with projects of this nature, a time and material contract would be preferred. The unknown risks on projects with ongoing design, continual changes, variable FY budgets doesn’t lend itself to fixed price contracting. ISubKtor believes there will be an added benefit to the overall cost and schedule by contracting under a Time and Material or Cost-reimbursement contract.

T&M contracts subject the Government to more risk, but the delays and unknowns that drive this associated cost must inherently be borne by the Government. As exhibited by the IG’s T&M FFP comparison, though, using T&M on selected contracts on this project actually minimize delay and inadequately defined scope risks to the government. For instance, the Government will neither incur change order cost and delay, nor have to comply with the additional requirements of CR contracting. All Government contract manuals state the Government should bear the greatest risk in the most technical and complex contract agreements, but using T&M contracts on selected aspects of MFFF construction actually turns the traditional paradigm of risk allocation on its head. T&M contracting is actually more cost and time efficient than CR and FFP because of all the previously enumerated NQA-1 time and cost delays, as well as the numerous schedule and design revisions. The adaptability of T&M contracting is simply the only possible methodology that allows the MFFF project to be completed most cost efficiently and “at the earliest practicable date.”

**Project Description**

MOX Services has been contracted by the Department of Energy of the United States of America to “provide the personnel, facilities, equipment, materials and services (except as may be furnished by the Government), and otherwise do all things necessary for, or incident to providing its best efforts so as to carry out in an efficient and effective manner the necessary and related work to

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NOTE: This paper will progress by initially defining and evaluating realistically possible contract types (citing and adhering to Federal Acquisition Regulation sections, where appropriate), followed by incorporating the MFFF MOX requirements and actual working environment, and concluding with the appropriate and supported recommendation that would be most likely to lead to timely completion, at minimal cost (considering the highest quality requirements and standards), and with an adequate and operable facility. The United States Government Accountability Office specifically cited such an evaluation of contracts by Government Contracting Officers as a deficiency in both its DOD reviewed contract study in GAO-07-273, as well as its June 2009 T&M contract study GAO-09-57, and this document will help eliminate such a deficiency when this Prime Contract is reviewed.


6 Prime Contract.
accomplish the requirements [as] set forth in the Description, Specifications, and Statement of Work.7

The Prime Contract Statement of Work, J.1.1(l)(A) refers to the “world’s plutonium which is excess to defense requirements [as] a “clear and present danger,” and work done at the construction of the MFFF is specifically being pursued to “mitigate the plutonium proliferation danger.”8 The Prime Contract goes on to state, “both parties hereby agree to act in good faith to ensure all steps are taken to reach final disposition of this scope, cost and fee at the earliest practicable date,”9 The contract thereafter continues to place an emphasis on the “earliest practicable date,”10 and specifies that “both parties agree to act in good faith to ensure all steps required to [achieve hot start up and AP start up] [are added] to the scope of work with additional cost, fee, and schedule”11 in order to achieve such operations “at the earliest practicable date.”12

Acting in good faith, and in order to ensure that the MFFF is completed in the most cost-effective and timely fashion, while meeting the United States Nuclear Regulatory Commission’s enforced NQA-1 quality requirements, an unbiased evaluation of commonly utilized contract types in the construction industry follows. The purpose of the evaluation of contract types is to ensure that MOX Services is appropriately using T&M contracting for those selected few contracts, while also placing the special emphasis on a working product built to specification and delivered “at the earliest practicable date.”13

Factors in Selecting Contract Type

The Prime Contract and guiding principles in FAR and DEARS should be used when selecting appropriate contract types. FAR Subpart 16.1 enumerates all considerations a contracting officer must make when selecting contract type. Outside the normal discussion of price competition, price analysis, and cost analysis, of particular importance for the construction of the MFFF is the base contract language, which emphasizes delivery “at the earliest practicable date,” as well as the complexity of the MFFF.

FAR 16.104(d) states, “[c]omplex requirements, particularly those unique to the Government, usually result in greater risk assumption by the Government. … This is especially true when performance uncertainties or the likelihood of changes makes it difficult to estimate performance costs in advance.” MOX Services is also aware of the fact that if the requirement “recurs or the cost risk should shift to the contractor, a fixed-price contract should be considered.”14 To that end firm fixed price (FFP) contracts will be utilized wherever practicable.15 However, when considering:

1.) The extensive delays and work stoppages associated with having to modify work or performance under an FFP;

2.) The urgency placed on the contract for the reduction of nuclear weapons material, which the Prime Contract calls a “clear and present danger;” and

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7 Prime Contract.
8 Id.
9 Id, B.1(f).
10 Id, B.1(f)-(g).
11 Id.
12 Id, B.1(g).
13 Id, throughout Part I, Section B.
14 FAR 16.104(d).
15 FAR 36.207.
3.) The fact that the MFFF is being developed specifically to reduce weapons grade plutonium proliferation and meet international treaty mandates,

Then these elements should bear on the decision of which contract type to select.

In addition, when considering contract types that require adequate accounting systems from the contractor, the Government and MOX Services must consider whether:

1.) CAS compliant contractors would be willing to bid the work;

2.) If not, then whether either delaying the project to permit time for a contractor to implement a CAS compliant system would be reasonable;

3.) A non-CAS compliant construction contractor wants to become CAS compliant;

4.) If MOX Services and the Government want to allow MFFF construction to be a testing ground for whether or not a non-CAS compliant contractor can actually successfully implement and be compliant to the CAS requirement; and

5.) Whether or not a CR contract will minimize all the added costs and delays at the MFFF, and whether labor can be redistributed to other project areas and scopes of work if such delays are unavoidable.

With regard to delivery and performance, contract terms are the prime consideration in contract interpretation. When contract terms place special emphasis on timeliness of delivery, e.g., at “the earliest practicable date,” it is important to pursue and utilize all contract tools at the disposal of the parties to ensure such delivery. In addition, even the Department of Defense, which has a special proclivity toward eliminating the utilization of time-and-materials contracting, could utilize T&M contracting for plutonium proliferation defense and the minimization of the threat of weapons grade plutonium proliferation.

Finally, time-and-materials contracting should be the last tool utilized, but when working in the arena of plutonium reduction, T&M contracting may be the most useful tool to actually ensure timely delivery and treaty term mandates. With regard to the MFFF, MOX Services is currently operating without a funding profile for more than the current fiscal year, and major aspects of MFFF construction are therefore reasonably going forward under T&M contracting. It would be hard to fathom a reasonable business minded construction contractor willing to go forward with a multi-year FFP contract under an undefined scope when there is no reasonably sound funding profile for that same duration. Neither could a contractor properly schedule work, nor could they know that if they scheduled work in out years beyond the current fiscal year that they would actually realize the business profit and growth associated with those out years.

16 FAR 16.104(f), (i).
17 DE-AC02-99CH10888, Mod No. 243, Part I, Section B – and throughout the Prime Contract.
18 See DARS Tracking Number: Deviation 2012-O0016; DFARS 216.6.
Feasible Usable Contract Types

Firm-Fixed-Price

A fixed firm fixed price contract presents the least risk to the Government. The contract is not subject to price adjustment. A contractor bears maximum risk and full responsibility for profit and loss within this type of contract. Firm-fixed-price contracts require minimal administrative burdens on the parties involved, and can be awarded using sealed bidding procedures. The contracting officer may also use award-fee and performance or delivery incentives with firm-fixed-price contracts. Finally, fixed price contracts can be utilized for various requirements, but are generally not suggested for exploratory development or test/demonstration production.

Firm-Fixed-Price Application

The Federal Acquisition Regulation (FAR) Part 16.202-2, states that,

A firm-fixed-price contract is suitable for acquiring commercial items or for acquiring other supplies or services on the basis of reasonably definite functional or detailed specifications when the contracting officer can establish fair and reasonable prices at the outset, such as when -

(a) There is adequate price competition;

(b) There are reasonable price comparisons with prior purchases of the same or similar supplies or services made on a competitive basis or supported by valid certified cost or pricing data;

(c) Available cost or pricing information permits realistic estimates of the probable costs of performance; or

(d) Performance uncertainties can be identified and reasonable estimates of their cost impact can be made, and the contractor is willing to accept firm fixed price representing assumption of the risks involved.

Firm-Fixed-Price Limitations

Firm-fixed-price (FFP) contracts shall be used when there is minimal risk involved with a predictable and acceptable degree of certainty. In addition, there must be reasonably definite functional or detailed specifications such that the contracting officer can establish “fair and reasonable prices at the outset.” When risk is not defined or definable due to the fact that numerous schedule delays occur, designs continually change, and/or quality control inspection delays are incalculable, no Government contract manual suggests burdening either a Prime or subcontractor with these unknown risks.

Fixed-price Incentive Contracts

Fixed-price incentive contracts place only slightly more risk on the Government. These contracts are able to be used when the contracting officer can establish “reasonable and attainable targets that can clearly be communicated to the contractor,” and “appropriate incentive
arrangements” can be made.” If any incentives are to be used in a contract, cost must always also and firstly be incentivized. Finally, incentives may only be used if delivery and technical performance can be acquired at lower costs by relating profit to performance.

**Fixed-price Incentive Contract Application**

In order for a fixed-price incentive contract to be used, the contracting officer must be able to establish a final contract price through the “application of a formula based on the relationship of total final negotiated cost to total target cost.”

**Fixed-price Incentive Contract Limitations**

This type of contract is appropriate where “a firm-fixed-price contract is not suitable,” and the “contractor’s assumption of a degree of cost responsibility will provide a positive profit incentive for effective cost control and performance,” and “the contract also includes incentives on technical performance and/or delivery, [which] provide a reasonable opportunity for the incentives to have a meaningful impact on the contractor’s management of the work.”

**Fixed-price incentive (firm target) contract Limitations**

This type of fixed-price incentive (firm target) contract may only be used when the contractor has an adequate accounting system such that final cost and incentive price revision may be calculated, and “[a]dequate cost or pricing information for establishing reasonable firm targets is available at the time of initial contract negotiation.” In order to use this type of contract, target cost and profit must be specified, and there must also be a specified price ceiling with a profit adjustment formula.

**Fixed-price incentive (successive targets) contract Limitations**

This type of contract may only be used when the following are negotiated at the outset of the contract:

(i) An initial target cost;
(ii) An initial target profit;
(iii) An initial profit adjustment formula to be used for establishing the firm target profit, including a ceiling and floor for the firm target profit;
(iv) Sufficient information is available to permit negotiation of initial targets;
(v) There is reasonable assurance that additional reliable information will be available at an early point in the contract performance so as to permit negotiation of either (i) a firm fixed price or (ii) firm target and formula for establishing final profit and price that will provide a fair and reasonable incentive.

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24 FAR 16.401(a)(1).
25 FAR 16.401.
26 FAR 16.403.
27 FAR 16.403(b)(1).
28 FAR 16.403(b)(2).
29 FAR 16.403(b)(3).
30 FAR 16.403-1(c).
31 FAR 16.403-2(1)(i)-(iii).
32 FAR 16.403-2(b)(2)-(3).
The contractor’s accounting system is adequate for providing data for negotiating firm targets and a realistic profit adjustment formula, as well as later negotiation of final costs; and

Cost or pricing information adequate for establishing a reasonable firm target cost is reasonably expected to be available at an early point in contract performance;\(^{33}\) and

A contract schedule can be created that would provide initial target cost, initial target profit, and initial target price for each item subject to incentive price revision.\(^{34}\)

**Reasonableness of Using FFP for those Selected Contracts Currently Slated for T&M**

In order to use any of the fixed-price contracts, a contractor would have to be willing to assume all of the risk associated with potential cost overrun. Contractors would then fully operate to the call of cost/quality reduction. Lowest-price-technically acceptable, which that methodology would essentially be, simply does not make sense when considering nuclear construction. A nuclear facility must comply with IAEA, NRC, and NNSA guidelines, including NQA-1 quality requirements that require not only quality evaluation of every QL-1 quality, but also verifiably produced, spec’d out, traceable, and quality compliant end products.

Utilizing fixed-priced contracting on the MFFF is problematic because of the great many factors affecting the subcontractor’s performance and cost, which are outside the subcontractor’s control – quality and quality compliance is only one of the complicated variables. Additionally, based on the volume of changes currently occurring, the future administrative mitigation of contractor risk would be infinitely excessive due to the volume of contingencies and/or numerous requests for equitable adjustments that would occur. These problems were exemplified when Baker attempted to pour the concrete for the main structure; the fixed-price contract was eventually abandoned for a T&M contract awarded to ASuktor. This was the only major completed T&M subcontract to be evaluated by the DOE IG, and it was found that the T&M was more cost effective per cubic yard after all change orders were considered.

Text book requirements of firm-fixed-price (FFP) contracting are also absent. For instance, FFP requires a reasonably definite functional or detailed specification in order that the contracting officer can establish fair and reasonable prices at the outset.\(^{35}\) With regard to the MFFF, the Title II design is essentially complete, but it is well-established that an inordinate amount of Title III design activities are required to complete construction. This effort will be accomplished concurrent with installation activities. Consequently, even if design is labeled “complete,” the detailed level of inspections, and multiple requirements and interferences from temporally and locally parallel work activities require additional design change requests (Engineering Change Requests (ECR), Nonconformance Reports (NCR), and Field Change Requests (FCR)) in order to complete installation. Moreover, inefficiencies relating to the mobilization and demobilization of multiple subcontractors on a room-by-room basis, as well as continually changing priorities result in vendor delays, shifting priority schedules, and overall project schedule management as a whole.

Finally, no industry, government, or United States guideline suggests using fixed price contracting with a project as complex as a nuclear facility. The MFFF is not only the first of its kind in the United States, but also the intricacy and complexity of the MFFF alone would

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\(^{33}\) FAR 16.403-2(c)(1)-(2).

\(^{34}\) FAR 16.403-2(d).

\(^{35}\) FAR 16.202-2.
substantially push the subcontracts outside the realm of the fixed-price contracting framework. Technically complex fabrications, critical line slopes relating to gravity fed internal systems, accounting for multiple dynamic radius bends throughout 600+ unique rooms, having to account for follow-on work completion prior to what would otherwise be temporally scheduled first in the overall design of the facility, in-line fabricated equipment requirements, multi-use supports attaching to multiple different systems, as well as unique welding techniques distinct to the nuclear facility (and therefore limited craft labor feed pools) require fabrication with the flexibility to adjust to engineering and schedule perturbations; change order costs would include engineering change cost and delay, administrative cost and delay, as well as work stoppage costs. The sequence of fabrication is also very critical for a successful installation and transition to cold startup. See Prime Contract stating the facility design is “highly technical in nature,”[36] and that “[c]ontinuous modifications and capability expansion are required to be implemented,”[37] and must be “[a] design where the contractor is able to incorporate alternative feedstock capabilities,”[38] making the design even more complex while disrupting an iterative installation process.

There are still efforts at the MFFF in which firm-fixed price can and are utilized; wherever and whenever the firm-fixed price contract can be utilized, it will be done. However, whereas upgrading jet engines may move from T&M contracting to fixed-price contracting as learning curves continue to improve,[39] such increase in learning would not likely occur with the MFFF. Each room is unique inside the building. Almost every bend and turn differs on a per room basis. This makes fixed-pricing unlikely, if not impossible. Hindering the opportunity for firm-fixed price contracting, is the number of qualified contractors that are qualified, capable, and willing to perform; larger contractors may not be willing to perform “smaller” fixed price contracts, and smaller contractors may not have the capability and qualification to work on an NQA-1 project.

Cost-Reimbursement Contracts

Where a fixed-price-type contract is not possible, a contracting officer may turn to a cost-reimbursement-type contract. Cost-reimbursement contracts pay for allowable incurred costs by establishing estimated total cost, establishing a not-to-exceed ceiling, and evaluating each cost for allowability.[40] In addition, contractors performing straight cost-type contracts do not receive a fee for their performance.[41] This type of contract may be appropriate where the requirements and/or costs cannot be defined in such a manner that would allow for fixed-price contracting, and where uncertainties exist with regard to contract performance such that costs cannot be estimated with any accuracy.[42] The contracting officer should also be cognizant of the additional burden the government must bear in managing contractor costs.[43]

Of prime importance to using cost-reimbursement contracts in construction contracting is the fact that the contractor must have an adequate accounting system such that costs are recorded, determinable, and there are adequate MOX Services resources available to award and manage the particular type of contract. In particular, MOX Services must be available to surveil the contract such that there are “assurances of efficient methods and effective cost controls [in use].”[44] In addition, where non-commercial or non-competed subcontracts are, in aggregate, $7.5 million or

37 Prime Contract J.1.5(2)-J.1.6(3) Expanding Aqueous Polishing Capabilities Trade Study.
38 Prime Contract, K.J.1.6(3).
39 GAO, June 2007, PGs 4-5.
40 FAR 16.301-1.
41 FAR 16.302.
42 FAR 16.301-2.
43 FAR 16.103(d)(1)(ii).
44 FAR 16.301-3.
more modified Cost Accounting Standards (CAS) apply, and where a subcontract holds contracts, in aggregate or singular, in excess of $50 million full Cost Accounting Standards are applicable (where the presence or absence of certain conditions helps determine CAS applicability).45

NOTE: ALL OF THE REQUIREMENTS OF COST-REIMBURSEMENT BASED CONTRACTS APPLY TO ALL CONTRACT TYPES WITHIN THIS SECTION, IN ADDITION TO ALL OF THE UNNESCED TRAITS OF EACH INDIVIDUAL TYPE OF COST-REIMBURSEMENT CONTRACT DISCUSSION BELOW IN THIS SECTION.

Cost-plus-incentive-fee Contracts (CPIF)
This is a type of cost-based contract where all allowable costs will be paid, and the contractor and contracting officer initially negotiate a fee, which will later be adjusted based on a formula relating allowable costs to total target costs.46

CPIF Contract Limitations
CPIF is only intended where the contractor can be motivated to manage costs [and delivery schedule] more effectively.47

Award Fee Incentive Contracts
An award fee contract allows MOX Services to judgmentally evaluate contractor performance, and pay an award amount to the contractor based on the respective Contracting Officers judgmental evaluation.48 Award Fee contracts are suitable where “[t]he likelihood of meeting acquisition objectives will be enhanced by using a contract that effectively motivates the contractor toward exceptional performance and provides MOX Services with the flexibility to evaluate both actual performance and the conditions under which it was achieved.49

Award Fee Incentive Contract Limitations
All of the limitations in FAR 16.301-3 have been complied with, including that the contractor must have an adequate accounting system in place for determining costs applicable to the contract in place. The contracting officer must also be able to subjectively measure and evaluate contractor performance with regard to items like logistics support, quality, timeliness, ingenuity, and cost-effectiveness.

Cost-plus-fixed-fee Contracts (CPFF)
CPFF contracts are those that the Government provides for “payment of the contract on a negotiated fee, [which] is fixed at contract inception.”50 CPFF fees do not vary with cost, but do have the possibility of changing as the contract is varied, changed, or adjusted. Regardless of adjustment, though, the contractor is always entitled to the fixed fee determined at inception. Finally, CPFF contracts have suggested uses in research or preliminary exploration or study where the level of effort is unknown, or for development/test purposes.51

46 SEE FAR 16.304 and FAR 16 Subpart 16.4.
47 FAR 16.405-1.
48 FAR 16.305.
49 FAR 16.401(e)(1)(ii).
50 FAR 16.306.
51 FAR 16.306(b).
Cost-plus-fixed-fee Contract Limitations

CPFF can be used when CPIF contracting is not practical. For completion cost-plus-fixed-fee varieties of contract, the scope of work must be “sufficiently definable, and there must be a definite goal or target specifying an end product.”52 For term cost-plus-fixed fee varieties of contract, the contractor works for a defined term with a level-of-effort type of evaluation.53

Suggested Uses of Cost-Contracts

The FAR suggests, “cost contract[s] may be appropriate for research and development work, particularly with nonprofit educational institutions or other nonprofit organizations.”54 The FAR also alludes to this type of contract utilization where contractors may otherwise be at too great of risk if they enter into any other type of agreement.

Reasonableness of Using CR for those Selected Contracts Currently Slated for T&M

Cost-reimbursement (CR) contracts are preferred to time-and-materials contracts. CR contracts also fit with the tenuous nature of pricing potential contracts at the MFFF building. However, the major drawback to using a CR contract is that the contractor must have an adequate accounting system that would be sufficient enough for the Defense Contract Audit Agency (DCAA) to determine whether or not any given particular cost is allowable. It is also common knowledge that DCAA workload is currently 6-8 years behind schedule.

FAR 16.104(d) states, “before agreeing on any contract type other than FFP, the CO must make sure the contractor can produce timely cost data in the form required by the contract.” Cost Accounting Standards (CAS) would also apply to all contracts, in singular or in aggregate, when the contractor performs work in excess of $7.5 million (modified CAS coverage) or $50 million (full CAS coverage), and this creates an additional hurdle to writing cost-reimbursable contracts. MOX Services must also ensure that it has adequate resources to award and manage the contract; not to mention the endless amount of disputes that could arise from disputes between the parties as to whether some particular cost is allowable under or allocable to the contract (and must ensure effective government oversight).55

In addition, cost-reimbursement contracts still have not-to-exceed ceilings. Given all of the uncertainty for both the subcontractor and MOX Services, a majority of these contracts will probably have to be re-evaluated, have ceilings increased, and thereafter have baselines, awards and incentives re-adjusted – this adds to the complexity of CAS compliance. When considering NQA-1 qualified contractors willing to bid as subcontractors to MOX Services, many of them do not have CAS compliant systems. This does not mean they cannot accurately estimate costs, but they have never had a need to have such complex accounting systems – the cost/benefit analysis of implementing such a compliant system probably never came out favorable to implementing it.

Regardless of CAS compliance, it not only seems questionable how to appropriately quantify time delays associated with quality control requirements, but also a highly risky bet to attempt to accurately quantify delays caused by parallel interfering work. Delays will inevitably lead to funding modifications and substantially increased total overall costs. Like when Baker looked good from an FFP cost standpoint when bidding MFFF concrete framing requirements, it turned out that T&M was more cost-effective on a per-cubic-yard comparison basis when considering all the

52 FAR 16.306(d)(1).
53 FAR 16.306(d)(2).
54 FAR 16.302(b).
55 Manuel, Contract Types: Legal Overview, PGs 8-10.
modifications required to the FFP contract; this would predictably be the case in any CR contract. The Government also bears the risk of subcontractor cost per hour, as well as the number of hours it takes to complete a task. Furthermore, every time costs balloon, any incentive or award fee must be re-evaluated and re-attached to the contract in a manner that will be perceived to, and actually, control cost and/or performance in a useful and meaningful way. It seems nearly impossible, then, to execute a cost-reimbursement contract in an efficient and “as defined” manner.

**Time-And-Materials/Labor Contracts**

The time-and-materials (T&M) contract is a type of contract that, in the instance of the MFFF construction, obtains a subcontractor to work on a project where the “extent or duration of work or [the ability to] anticipate costs [is not possible] with any reasonable degree of confidence.” This contract vehicle pays direct labor hours at a fixed hourly rate, inclusive of overhead, general and administrative expenses, as well as profit for both conforming and non-conforming work.57

Although FAR cites T&M contracting as the least preferred type of contract, the T&M is not prohibited (like cost-plus-a-percentage-of-cost contracts are,58). The Department of Energy also does not have any deviation specifically enumerating the only instances where T&M contracting should be utilized. The FAR does, however suggest the “contracting officer should avoid protracted use of cost-reimbursement or time-and-materials contract[ing] [if] after experience provides a basis for firmer pricing.”59 It should be noted that where nearly all of the 600+ rooms in the MFFF require different design plans and glovebox installations, in addition to each room having different installation limitations, requirements, and design changes and modifications, the learning curve leading to allowing the possibility of using FFP contracting really does not materialize in the MFFF. In addition, where the Prime Contract defines the task of plutonium disposition specifically being pursued “to mitigate the plutonium proliferation danger…[where] a concept [is being used] to make the plutonium as unattractive and inaccessible for retrieval and weapons use as a the residual plutonium in the spent fuel from commercial reactors,”60 then this can be interpreted as a “[transaction for the potential defense against … terrorism or nuclear attack],”61 where under such a definition T&M contracts are specifically authorized by all Governmental entities.62

FAR also asserts utilization of a Time and Materials Contract in instances where:

1.) Either labor (as defined in FAR 16.601(b) and (c)(2)), but not materials (as defined in FAR 16.601), is supplied by the contractor,63 or both labor and materials are supplied by the contractor;64

2.) The contract is awarded using competitive procedures,65 or alternatively, where suitable, appropriate, and authorized, procedures of other-than-full-and-open competition are utilized,66 but wherein adequate price competition may or may not exist for non-

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56 FAR 16.601(c).
57 FAR 16.102(c).
58 FAR 52.246-6 and Alt. IV; General Dynamics Corp. v. United States, 671 F.2d 474, 480-81 (Ct. Cl. 1982); McDonnell Douglas Corp. v. United States, 37 Fed. Cl. 295, 299 (1997).
59 SEE FAR 16.102(c).
60 DOE Contract DE-AC02-99CH10888, PG J.I.1(I)(A).
61 Services Acquisition Reform Act of 2003, Sec. 319.
62 Services Acquisition Reform Act of 2003; DFARS Class Deviation 2012-O0016.
63 FAR 16.602.
64 FAR 16.601.
65 FAR 12.207(b)(1)g)(A).
66 FAR 12.207(b)(1)g)(B).
commercial item acquisitions, depending on the need, acquisition, and possibility of competition.\(^{67}\)

3.) A D&F has been executed asserting no other contract type is suitable for such award.\(^{68}\)
   a. Whereas, “a description of the market research conducted [is included];”\(^{69}\)
   b. It is “not possible at the time of placing the contract to estimate accurately the extent or duration of the work or to anticipate costs with any reasonable degree of confidence;”\(^{70}\)
   c. And “actions [are planned and described] to maximize the use of firm-fixed-price or fixed-price with economic price adjustment contracts on future acquisitions for the same requirements;”\(^{71}\)

4.) A ceiling price has been set;\(^{72}\)

5.) Utilization of said time-and-materials contract is “[a]pproved by the head of the contracting activity prior to the execution of the base period when the base period plus any option periods exceeds three years;”\(^{73}\)

6.) There is appropriate [MOX Services] surveillance of contractor performance such that “reasonable assurance [may be given to ensure] efficient methods and effective cost controls are being used.”\(^{74}\)

The Benefits to Using Time and Materials Contracts

T&M contracting clearly has its advantages. Among the reasons are:

1.) T&M contracting is adaptable to a wide variety of service needs and circumstances, which makes it attractive when an agency expects service requirements to emerge on short notice and [the contracting officer] wants to have a contractor already on hand [especially when delivery time is an essential part of the contract].

2.) T&M pricing facilitates ad hoc specification of the work as it proceeds, without extensive advance planning, specification, and price negotiation, and without the administrative costs and delays associated with numerous source selection, formal change orders, and supplemental agreements.

3.) T&M does not require as much auditing as cost-reimbursement contracts; DCAA is not required in T&M contracting as much as it is in CR contracting.

In short, T&M pricing is “flexible” and administratively expedient.\(^{75}\)

67 FAR 16.601(f).
69 FAR 12.207(2)(ii)(B).
70 FAR 16.601(c).
71 FAR 12.207(2)(iv).
72 FAR 12.207(b)(1)(ii)(A).
73 FAR 16.601(d)(1)(ii).
74 FAR 16.601(c)(1).
75 Edwards, PG 6.
T&M contracting may only be used if it is not possible at the time of contracting to sufficiently estimate with any accuracy the extent or duration of the work or anticipated costs (and all the other requirements listed above are met). MOX Services must also implement an adequate surveillance system to “ensure that efficient methods and effective cost controls are being used.” Finally, to restrict T&M contract use one must believe 1.) The contractor is trying to be inefficient under his own volition (rather than the nature of the work being performed inherently causing justifiable inefficiencies), and 2.) That tying performance to some sort of incentive would end the inefficiencies commonly associated with T&M contracting.

T&M Considerations when working within MFFF MOX Framework

The United States Government Accountability Office undertook two separate efforts to assess proper application of contract type, as well as compliance with contracting rules as they relate to time and materials contracts. The June 2007 GAO report concluded that improved oversight and controls were needed within the Department of Defense’s (DOD) contract management. They found that because T&M contracting is of the highest risk to the Government, the following process steps needed to be implemented in association with all T&M contracts:

1. Require written justifications for the use of time-and-materials contracts and task orders;
2. Justifications needed to contain sufficient facts and rationale to justify that no other contract type authorized is suitable;
3. Contracting Officers needed to address the specific characteristics of the acquisition that prevent the use of either a cost-reimbursable or fixed-price contract;
4. Establish that the requirement has been structured to maximize the use of fixed price contract type on future acquisitions for the same or similar requirements; and
5. T&M contract D&F must enumerate contractor actions planned to maximize the use of fixed-price contracts on future acquisitions for the same requirements.

The Department of Defense undertook to substantially implement all recommendations from the June 2007 GAO study.

In 2009, the GAO undertook a second study, finding that there was minimal compliance with the new safeguards as outlined above – however, this GAO study mainly focused on compliance with commercial item T&M contract compliance. Stepping outside FAR Part 12, commercial item purchases, the GAO went ahead to note problems in all contract management areas. The GAO noted there were education requirements that needed to be implemented in order

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76 FAR 16.601.
77 Edwards, PG 5.
78 E.g., contractors inefficiently performing in order to perpetuate the contract (to keep earning a paycheck). In MFFF construction, contractor inefficiency is tied to NQA-1 requirements (especially QL-1 installation, but also QL-2 through QL-4 requirements when juxtaposed on QL-1 installation), building/room design revisions, quality control inspection limitations, and high technical complexity.
79 SEE Edwards, Page 5-12 asserting a contractor is being rewarded for inefficiency.
80 GAO, June, 2007. PG 37.
that contracting officers fully understood contract types, as well as proper assessment of each contract type to the Government. They also recommended various FAR language changes.

The GAO study review sets the current state of environment in which the Government contracting world currently exists. The fact is the Government simply wants to minimize its risk, and therefore the utilization of T&M contracting, except in those circumstances where they are absolutely necessary. Because the MFFF project relies on T&M contracting for its construction activities, it is especially important for the project to evaluate its contract management techniques and processes to the letter of the law. In this way, the MFFF project will be most capable of achieving its mission without the need for seemingly endless and costly review of contracting methodology. The following will evaluate, review, and discuss why T&M contracting is being used, as well as the plan forward to maximize the least risky type of contracting possible.

**Reasonableness of Using T&M for those Selected Contracts Currently Slated for T&M**

Although T&M contracting is the least preferred type of contract, it plays an important role in executing contracts such as the construction of the MFFF. T&M contracting is particular useful in constructing the MFFF because of all the delays, unknowns, and emphasis on MFFF delivery at the earliest practicable date. The nature of T&M contracts take away the problem of having to estimate duration and cost because the work continues until completion – explanations of overruns, if and when they occur, can take place after they actually happen (rather than having to predict unknowns, and subsequent cost-guessing before the project even begins). Not only that, but the MFFF is being constructed “to mitigate the plutonium proliferation danger… [where] a concept [is being used] to make plutonium as unattractive and inaccessible for retrieval and weapons use as the residual plutonium in the spent fuel from commercial reactors,”\(^{81}\) and T&M contracting can ensure MFFF delivery at the earliest practicable date possible. Goal attainment is especially important in a “[transaction for the potential defense against… terrorism or possible future nuclear attack],”\(^{82}\) and T&M contracting is specifically authorized as an appropriate use in both the seemingly parallel, though more restrictive, guidelines of the Services Acquisition Reform Act of 2003, as well as the DFARS Class Deviation 2012-O0016.

The MFFF will not allow offerors to accurately estimate the scope of work at the time of contract award with any reasonable degree of confidence such that a fixed price contract could be meaningfully awarded for the following reasons:

1. **Design Completeness and Changes to Design as Completed** – MFFF design is not fully complete and information on capital equipment remains open. To date there remain procurement packages awarded for capital equipment, as well as incomplete final submittals on a majority of those open packages. Numerous procurement packages are also yet to be awarded. It is expected that numerous design changes will occur as the nature of the building changes on an almost room-by-room basis (as room fit-ups occur), and these changes are expected to continue until all of the equipment required has been designed and completed. Not only that, but also designs will change until final fit-ups of completed capital equipment (glove boxes, electrical equipment redundancy requirements, etc.) are actually resolved and installed in the MFFF itself. These issues prevent adequate estimates on both scope and cost.

\(^{81}\) DE-AC02-99CH10888, PG J.1.1(I)(A).

\(^{82}\) Services Acquisition Reform Act of 2003, Sec. 319.
2. **CP09-1 Pipe and Supports Installation** - currently there are approximately 30,000 pipe spools that have been fabricated and are available for installation. The bulk of these spools were fabricated to “Issued For Fabrication” (IFF) drawings. Nearly all of those spools will require some level of field modification as part of the installation process. This is as a result of equipment connection and location changes, changes in seismic/support requirements and other factors impacting final design. A FFP installer would need to compare every IFF drawing to the current IFC (Issued for Construction) revision in order to bid the correct amount of rework, or put a large contingency in for each spool piece, or create a change order for each spool prior to the start of work.

3. **CP21-3 Electrical Installation** - the majority of conduit and its supports are to be “field routed or placed” with only proposed conduit routing in many areas. As a result, any fixed price bid would be based solely on blind assumptions and will likely result in the contractor embedding significant contingency-based costing models into their pricing. Commercial practice is to install conduit supports as they are needed for the field routed conduit. The types of supports are not determined until the location of conduit is determined. And, MFFF requirements place a substantial burden on the installers, who cannot possibly determine the number and type of supports at the time of bidding. This adds to the difficulty of requesting fixed price bids. Complicating the installation, the cable pulling and termination must take place through areas that will be highly congested with equipment and other construction craft and supervision. This effort will encounter numerous starts and stops which will make the installation process extremely inefficient. Electrical conduit and cable are the easiest commodity to relocate in the case of unanticipated interferences with other commodities and therefore are frequently rerouted to accommodate changes in others commodities.

4. **CP24-1 Process Equipment Installation** - Tolerances specified in the design output for the facility and fabrication drawings for the glove boxes will require significant interface with Title III design engineers. Continuous interpretations of engineering change requests are also required for planning for installation. The amount of time required for this effort is not easily defined and cannot be fixed priced. Gloveboxes are different in design and the process equipment in each is intricate, therefore, no uniform installation process is available. Final alignment of interconnecting parts and systems is difficult to define and quantify.

5. **Technical complexity** of the equipment fabrications, critical line slope and radius bends of pipe systems, in line fabricated equipment, multi-use supports, unique welding techniques, and tight working quarters, make the MFFF an unusually complex facility. This complexity and its inherent difficulties render construction installation sequencing extremely complicated and results in numerous mobilizations and demobilizations of the various disciplines. Interface between multiple subcontractors and necessary “shared space” conditions further complicate the installation. Bidders, never having worked on such a facility, cannot possibly foresee these complexities and will experience inefficiencies and delays not included in their fixed-price proposals.

6. **Tolerances** - installation activities to date have found numerous instances where physical locations of walls are not per design. This adversely impacts commodity and equipment installation because actual layout activities are not known until the actual room-by-room layout actually occurs on a room-by-room basis. This impact cannot be determined at the time of bidding and would have to be addressed through multiple change order requests.
7. The **detailed level of work controls and inspections** associated with an NRC licensed facility cannot be adequately communicated to bidders in sufficient detail to support fixed price bidding. As such, bidders will either load proposals with contingencies or will submit large numbers of requests for equitable adjustment.

8. **It is not anticipated that the contractor will provide a significant amount of material and equipment**, and to control quality, all QL-1 through QL-3 material and equipment is supplied by MOX Services. Any problems in MOX Services supply chain therefore will impact the installation subcontractor. Making T&M most beneficial, during any inevitable delays contractors can be redirected to other work activities under a T&M contract. Contractors are not limited in scope to only one particular activity, therefore cost and schedule are inherently driven downward and positively impact schedule duration.

9. All QC **inspection and acceptance** is the responsibility of MOX Services. Any delay associated with these inspection services will have an impact on the subcontractor’s efficiency. Since all QL-1 installations must be inspected by MOX QC inspectors, it is not possible to have sufficient inspectors ready for every inspection request without delay. What’s more, under a firm-fixed-price contract the vendor will need to assume a certain amount of time delay, which is really an unknown, for each inspection, and thereafter price the job according to the incorporation of these unknown delays. Whenever delays don’t actually occur, a windfall occurs – and given the number of inspections required this windfall could be quite substantial.

10. Subcontractors will submit requests for equitable adjustment for the cumulative impact of multiple changes and possibly unabsorbed overhead due to delay and inability to recover its overhead costs through planned progress billings and resultant schedule slippage.

**Conclusions**

In conclusion, not only does T&M contracting mitigate the necessity for fixed-price subcontractors to continually request and input change orders, which would require work-stoppage until approvals are received, but it also minimizes the inevitable delays inherent on an NQA-1 project. MFFF construction turns traditional characterization of T&M contracting around by allowing contractors to be reassigned to other work when delays occur. This flexibility actually decreases schedule time and increases productivity. Based on responses to a recent HVAC Request of Interest (ROI) subcontractors, without hesitation, cited almost exactly the same reasons for selecting T&M contracting on the MOX project that MOX Services cites herein (SEE PG 5).

Given all of the characteristics of the MFFF project, it would difficult to believe that MFFF construction could proceed without T&M contracting. In lag and delay times associated with the quality requirements required by MFFF construction, the same flexibility that T&M allows contractor reassignment also ensures existing work is actually worked and subcontractors are minimally constrained. T&M subcontracting also provides the added flexibility of a direct hire workforce while taking advantage of the focused expertise a specialty subcontractor brings to the table.

In addition, the MFFF Prime Contract continues to have funding fluctuations and changing project/program directives; this situation is more amenable to T&M contracting. Labor costs can
also be more closely managed, tracked, and mitigated under the contracts selected for T&M. The Market determines that overhead rates are fair and reasonable with a T&M contract. Furthermore, in the only major completed T&M subcontract to be evaluated by the DOE IG, when a large FFP concrete installation contract (Baker) was compared with an analogous T&M contract for concrete installation (ASubKtor), it was found that the T&M was more cost effective per cubic yard after all change orders were considered.

Finally, MOX Services surveillance of subcontractor performance (conducted by MOX Services Construction Management, Procurement, Project Management, and Quality Control personnel) will ensure efficient methods and effective cost controls are being used. Not only that, but MOX Services will continue to use fixed priced contracting wherever practicable. What’s more, because cost controls on T&M projects include annual forecast of quantities to be installed and forecasted cost for performing the annual scope, weekly Quantity Unit Rate Reporting is also being used to measure performance so necessary actions to maintain the performance forecast continually occur. Monthly Variance Analysis is also performed to assure contractor progress is according to the Annual Plan. The following performance management tools will also control contractor performance and costs:

1. Area Project Managers (PM) and Subcontract Technical Representatives (STR) focus on each activity daily with the subcontractor, providing real time feedback and incorporation of work planning into each task;

2. Staffing levels and work shift hours are determined by MOX Services PMs/STRs. Manpower, schedule and activities will be documented on daily reports by the contractor and reviewed and signed by MOX Services STR.

3. Schedule activity meetings and Work Planning restraints meetings measure percentage of work performed, as well as, restraints and impediments and will focus MOX Services and the subcontractors on removing obstacles for adequate performance.

4. Overtime, if required to support the project, is planned and pre-approved by the MOX PM. Manpower is monitored to determine proper staffing levels.

5. Performance based incentives for Award Term (period of performance extension) and Cost and Schedule are developed to better achieve cost, schedule and safety performance results. The incentives and the metrics used to measure performance are incorporated into the contracts as applicable, and we have yet to measure the effectiveness of used incentives.

6. Rework is monitored by the contractor and MOX services, LLC to keep it at a minimum. The FAR clause 52.246-6, Inspection Time and Material and Labor Hour is incorporated into the contract. Replacement or correction of installed work presented for acceptance excludes that portion of the fixed hourly rate attributable to profit.

7. Labor base and fringe rates follow the Savannah River Site Project Labor Agreement rates, and staff base and fringe rates are proposed, evaluated, and substantiated on a case-by-case basis. Barring stoppage of work or changes to the original signed contract, markups to any rates are fixed for the life of the contract, including option periods.
# Contract Type Quick Reference for the MFFF

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Pro’s</th>
<th>Con’s</th>
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<tbody>
<tr>
<td><strong>Firm-Fixed-Price</strong></td>
<td>• Contractor bear’s Cost-overrun risk/cost</td>
<td>• MFFF has an unknown funding profile so it would be impossible to schedule work</td>
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<td>• Contractor must only perform to Statement-of-Work (SOW), and any design changes would require change order and repricing (upward)</td>
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<td>• Scope not well-enough defined</td>
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<td>• No workable baseline schedule or funding profile for out years</td>
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<td>• Large bonding requirement, which reduces the number of available contractors</td>
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<td>• Large built in contingencies</td>
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<td>• The contractor would not perform additional work without a change order, so endless change-order requests, administration, and additional pricing would be necessary – as well as continual associated delay and stoppage of work</td>
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<td>• This substantial size and volume of change orders effectively transfers risk back to the government (in a more substantial way as work would in fact stop until critical change order approval)</td>
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<td><strong>Cost-Reimbursement</strong></td>
<td>• Makes award and performance fee useful</td>
<td>• Government bears risk of cost per hour and number of hours required to complete project</td>
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<td>• CAS requirements would limit vendor pool</td>
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<td>• Vastly increases administrative burden</td>
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<td>• Dependence on DCAA, which is currently 6-8 years behind audit schedule, is created</td>
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<tr>
<td><strong>Time-and-Materials</strong></td>
<td>• Allows award and performance fee use</td>
<td>• The number of hours required for the project are enormous, and this cost/risk is borne by the government</td>
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<td>• Cost per hour risk chargeable to government is limited and borne by vendor</td>
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<td>• A hands-on technically competent team can monitor schedule and ensure compliance to standards</td>
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<td>• Attractive when requirements emerge on short notice such that a contractor is already on hand</td>
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<td>• Facilitates ad hoc specification of the work as it proceeds, without extensive advance planning, specification, and price negotiation, and without the administrative costs and delays associated with numerous source selection, formal change orders, and supplemental agreements.</td>
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<td>• Does not require as much auditing as cost-reimbursement contracts.</td>
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<td>• Contractor profit is “at risk” based on current pricing arrangements</td>
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Works Cited


