Call for FY 2022 DoD Frontier Project Proposals

Introduction

Purpose: The Department of Defense (DoD) High Performance Computing Modernization Program (HPCMP) has established DoD Frontier Projects to enable research, development, test, and evaluation (RDT&E), and acquisition engineering outcomes that would not be achievable using typically available HPCMP resources.

Overview: Please read this section carefully, as it details important changes to the Frontier program. In addition, please carefully review the requirements for proposals, as there have been some changes there as well. Frontier Projects will continue to pursue outcomes aligned with DoD mission priorities and be supported by multi-year commitments of exceptional amounts of high-performance computing (HPC) computational resources.

Starting in FY 2022, the HCPMP is making 2 significant changes to the Frontier Program.

1. **The HPCMP plans to execute two types of Frontier Projects: Foundational Research and Engineering Frontier Projects, and Applied Acquisition and Sustainment Frontier Projects.**
2. **The HPCMP is implementing a more rigorous review of progress. Projects that are not making adequate progress on initially stated goals may be either reduced in size or terminated.** Additional details are below.

Foundational Research and Engineering Frontier Projects will follow the guidelines that have been in place since the program started in FY 2014. However, they will primarily focus on science and technology (budget activities 6.1, 6.2, and early 6.3). These projects cannot easily be achievable using typically available HPCMP resources, and they are expected to use 100s of millions of core-hours per year, and/or 10s of thousands of GPGPU node-hours per year over a 2-4 year period.

Applied Acquisition and Sustainment Frontier Projects are planned to address DoD design, development, and test and evaluation projects; they will focus on programs of record, test and evaluation, and quick-response science and technology for urgent operational requirements. This type of project is generally more time-critical, has shorter execution timelines, and is expected to use 10s of millions of core-hours per year, and/or thousands of GPGPU node-hours over a 1-2 year period. As Frontier Projects, these projects will benefit from higher system priority that shortens timelines with enhanced throughput. Finally, there will be an option to start Applied Acquisition and Sustainment Frontier Projects outside the proposal cycle. The procedures for

this will be posted on the HPCMP website during the summer of 2021 prior to the start of FY 2022.

Eligibility: All Frontier Projects must be sponsored by a DoD government scientist/engineer, and must use HPCMP resources to enhance mission impact and capability. Principal investigators for Frontier Projects may be scientists or engineers from government, industry, or academia. If the principal investigator is a DoD government scientist/engineer, there is no need to name a separate DoD sponsor.

Relation to Existing Frontier Projects: The HPCMP seeks projects with high DoD mission impact and strong scientific merit. Foundational Research and Engineering Frontier Projects should not be duplicative of existing Frontier Projects.

We continue previous years' interest in receiving proposals from key focus areas that have been identified as being of high interest within DoD: (1) hypersonic systems; (2) autonomous systems/artificial intelligence; (3) future vertical lift; (4) electromagnetic/microelectronics development and design, and (5) directed-energy systems. Finally, we are interested in proposals that will be able to leverage the Program's increase in Secret collateral resources, as well as the soon to be deployed TS-SCI resources and the TI20 systems with significant GPGPU capabilities.

Of the ten active Frontier Projects, two projects will complete in FY 2021. The eight projects that will be active in FY 2022 with their corresponding computational technology areas (CTAs) are:

1. Prediction of Hypersonic Laminar-Turbulent Transition through Direct Numerical Simulation; Jonathan Poggie, Purdue University, sponsored by the Air Force Research Laboratory (CFD)
2. Earth System Prediction Capability; Joe Metzger, Naval Research Laboratory (CWO)
3. Integrated Computational Flight Simulation in Support of the Future Naval Capabilities (FNC) Dynamic Interface Virtual Environment (DIVE) Program; Susan Polsky, NAWCAD (CFD, IMT)
4. High-Fidelity Modeling and Simulation to Support Army Aviation Acquisition Programs; Andrew Wissink, Army Aviation Development Directorate, AMRDEC (CFD)
5. High-Fidelity Physics-Based Simulation of Kinetic and Directed Energy Weapons Integration Strategies for Future Air Dominance Platforms; Scott Sherer, Air Force Research Laboratory – Air Vehicles (CFD,CEA)
6. Terminal Ballistics to Advance Army Modernization Priorities; Robert Doney, Army Research Laboratory (CSM)
7. Whole Atmosphere NEPTUNE; P. Alex Reinecke, Naval Research Laboratory (CWO)
8. Direct Numerical Simulations of Turbulence at Hypervelocity Flight Conditions; Neal Bitter, Office of Naval Research (CFD)

The two projects that will complete in FY 2021 are

1. Validation of Turbulence and Turbulent Combustion Models for Air Force Propulsion Systems; Venkateswaran Sankaran, Air Force Research Laboratory (CFD)
2. CVN 78 Modeling and Simulation Validation for Full Ship Shock Trial (FSST) Alternative; Brian Lang, Naval Surface Warfare Center – Carderock Division (CSM)

A summary of all ten projects is included in Attachment 1.

Awards: Foundational Research and Engineering Frontier Projects may be proposed for up to a four-year duration. Applied Acquisition and Sustainment Frontier Projects may be proposed for up to a two-year duration; however, we expect many of the projects will be shorter than two years. Exceptional amounts of HPC computational resources will be provided to each project without regard to any quota based on the proposing Services/Agencies. Support is available from HPCMP assets such as the DoD Supercomputing Resource Centers (DSRCs), User Productivity Enhancement and Training (PET), and the Data Analysis and Assessment Center (DAAC).

Project Review: Frontier Projects will be reviewed twice a year by the High Performance Computing Modernization Program Office (HPCMPO). In addition, written quarterly progress reports are required for quarters that do not contain the Annual Project Review or On-Site Visit. The overarching goals of all reviews are to assure projects are on track, delivering mission-relevant impact, and resolving issues that projects are having with HPCMP systems and resources.

a. **Annual Project Review.** This review will be a formal project review meeting with HPCMP leadership and a technical review panel. As part of this review, HPCMP leadership and the technical review panel will make a progress assessment of each project. Projects that are not making adequate progress on initially stated goals may be either reduced in size or terminated. The intent is for this to be an in-person meeting with the option to conduct reviews at the Secret collateral level. Project Leaders are expected to attend all project reviews. If travel restrictions are in place, the meeting will be held virtually, and content adjusted to meet applicable security rules.
b. **On-site Visit.** Resource Management leads a small a group that includes Associate Director for Centers representation that visits each project for an in-depth review (normally 2.5 to 4 hours in duration). The primary focus of this review is to discuss significant details on the technical aspects of the project. Another significant focus is to identify and resolve issues with HPCMP systems, software, and resources.

Submission: All Frontier proposals must be submitted through the appropriate Service/Agency High Performance Computing Advisory Panel (HPCAP) principal to the HPCMPO. All proposals must be at the unclassified level. If an exception is needed for a classified submittal, please contact Michael Ausserer, at michael.f.ausserer.civ@mail.mil or 240-425-9057.

Proposals must be received by the HPCMPO by **3 May 2021**; however, HPCAP principals have established earlier internal deadlines. The HPCAP points-of-contact and dates for submission of proposals to the Services/Agencies are as follows:

- Air Force: Mr. Bryon Foster (Bryon.Foster@us.af.mil) and Mr. William Quigley (William.Quigley.5@us.af.mil). Submit proposals by 29 March 2021.
- Army: Mr. Robert Sheroke (Robert.M.Sheroke.civ@mail.mil), and Mr. Eldred Lopez (Eldred.I.Lopez.ctr@mail.mil). Submit proposals by 9 April 2021.
- Navy: Ms. Kathy Hollyer (kathy.hollyer.ctr@navy.mil). Submit proposals by 12 April 2021.
- DTRA: Ms. Jacqueline Bell (jacqueline.l.bell2.civ@mail.mil). Submit proposals by 12 April 2021.
- DARPA: Dr. Nick Lemberos (nick.lemberos@darpa.mil). Submit proposals by 29 March 2021.
- MDA: Mr. Jose Rivera (jose.rivera.ctr@mda.mil). Submit proposals by 12 April 2021.

Evaluation: Selection will based on the following two elements:

1. **DoD and warfighter mission impact**
2. **Technical excellence.** A technical review panel convened by the HPCMPO will evaluate proposals using the following criteria:
   a. Technical merit: Based on the project's goals, solution approach, management approach, and technical quality; what is the value of the computational work to the technical communities to which the project applies?
   b. Computational merit: How efficiently can the proposed project take advantage of the high-performance computing capabilities requested? Is the proposed computational approach robust, and is the software (existing and/or proposed) highly scalable enough to achieve the desired outcomes?
   c. Potential for progress: Based on the team's qualifications and previous work, does the team have the potential to complete the proposed work?

Selection: The HPCMP Director will select the FY 2022 Frontier Projects. Awards will be announced in early August 2021. Selected projects will be provided Frontier allocations starting 1 October 2021.

Questions: Contact Mr. Michael Ausserer, HPCMP Associate Director for Resource Management, at michael.f.ausserer.civ@mail.mil or 240-425-9057.

Proposal Contents

Frontier Project proposals are limited to 15 pages (single-spaced, standard 12-point font, one-inch margins); it is not necessary that the proposal be 15 pages, provided the required information in each category can be presented in fewer pages. It must be a single Word document, with the exception of the curricula vitae, which must be a separate document. If a Word document cannot be submitted, please contact your Service/Agency and the HPCMPO (frontier@hpc.mil) for suitable alternative formats. The cover page, resource request sheets, and any curricula vitae do not count against the 15-page limit. **Proposals must contain the following sections – ordered and numbered as indicated. It is essential that all sections contain the required information in the detail requested.** Suggested lengths for each section are provided.

Cover Page: (Length: 1 page maximum, does not count against the 15 page limit; see Attachment 2)

Project Title: Provide the title of the project.

Project Type: Specify Foundational Research and Engineering or Applied Acquisition and Sustainment.

Requirements Project Number(s): Provide the project number(s) (as reflected in the HPCMP requirements database) representing the project requirements on which the Frontier Project proposal is based. A proposal cannot be considered unless its resource requirements are reflected in the HPCMP requirements database. Please contact Tameka Jones at require@hpc.mil for further details.

Duration: Specify the expected duration of the project, in years (maximum of four years for Foundational Research and Engineering, and two years for Applied Acquisition and Sustainment).

CTA: List the primary and associated CTAs that best fit this project.

Estimated Resources by Year: Summarize the total estimated computational requirement on the Project Resource Request sheets by year, in millions of core-hours for traditional CPU requirements, and thousands of node-hours for GPGPU requirements (see Attachment 3).

Government Sponsor: Provide the government sponsor's name and contact information, if the principal investigator is not a DoD government scientist/engineer.

Principal Investigator: Provide the Frontier Project's principal investigator's name and contact information. Only one person should be listed, and that person will be the lead for interactions with the HPCMP during the project.

Key Collaborators: Provide a list of organizations or personnel planned to participate in the project.

Impact: Summarize the expected impact of the project to the DoD, the warfighter, and the technical community.

Technical Goals and Approach: Summarize the technical objectives of the project and the planned computational approach.

Major Applications Software: List major applications software that will be used.

Technical & Computational Challenges: Summarize anticipated challenges for the project and the planned computational approach.

Technical Proposal

Include the following topics in the proposal narrative:

Introduction: Introduce the project in broad terms. Include a general discussion of ongoing related work in both your organization and the scientific, technology, and/or testing community. (Length: approximately ½ to 1 page)

DoD Impact: Clearly state the DoD mission impact of the project and any current and future programs of record it will support. State the advantage to be gained by utilizing HPC capability. (Length: approximately ½ to 1 page)

Technical Approach: Clearly state the technical goals of the project and discuss the science, technology, and/or engineering activities that are required to meet these goals. Provide a plan for achieving these goals. Discuss technical challenges that will likely be encountered during the course of the project and how they will be overcome. (Length: approximately 3-6 pages)

Schedule and Anticipated Accomplishments: State clearly the duration of the project and provide a schedule in tabular form with estimated milestones and anticipated accomplishments for each year. **This is a key component of the proposal because it will be used to measure progress in the annual project review.** (Length: approximately ½ to 1 page)

Computational Approach: Describe the computational methodology and algorithms, and estimate the size of the problem with as many supporting details as possible. Discuss the relationship between early year developments and later year accomplishments. Discuss applicable software efficiency on scalable systems by stating the performance as a function of the degree of parallelism. Show evidence that the software provides sufficient foundation to scale to the problem size needed to achieve the goals of the project, and/or discuss software developments that will be required as a part of the project. Scalability information, including a graph of application performance for a typical test case versus the number of cores, should be included. **It is also particularly important that application codes are either fully developed or ready for use by each proposed project, or specific plans to reach that state of readiness are detailed in the proposal.** Discuss optimal computational architectures relative to available HPCMP resources. Discuss the computational challenges that will likely be encountered during the course of the project, how they will be overcome, and how this project will add to the computational state-of-the-art in this technical area. **Detailed justification must be provided for the level of computational resources required.** (Length: approximately 2-4 pages)

Progress to Date: Discuss preparatory work in the proposed technical area in this section. Elaborate on any HPC resources previously used by this project and/or efforts leading up to this proposed project. Discuss what work remains and how a Frontier Project can facilitate achieving the proposed work. (Length: approximately ½ to 2 pages)

Key Personnel: Identify the key personnel who will work on this project and summarize the background and qualifications of each participant, including each participant's projected level of effort. Provide an estimate of the size of the group that will perform this work, including an estimate of the percentage of time each team member will contribute to the project. Also include a discussion of possible incorporation of HPCMP team members into the project team. (Length: approximately 1-2 pages)

Required Computational Resources and Justification: Outline the computational resources required to accomplish this project in terms of total core-hours on HPCMP systems for all years of the project. **Provide requirements based on specific, current HPCMP systems for FY 2022 and FY 2023.** These early-year requirements must be definitive and reasonably accurate. Note that the HPCMP has now significantly increased the proportion of classified computing capability**. For the out-years, an estimate of the required number of core-hours can either be stated on current HPCMP systems or on a generic system architecture expected to be available. A list of current HPCMP systems is available at https://centers.hpc.mil**. Justification for the required level of computational resources can be provided by documenting known run-times on the same or similar architectures as proposed for the project and scaling those to address the project's goals. Include a discussion of any specialized memory, storage, networking, and/or software requirements. (Length: approximately 1-3 pages)

Computational Summary Sheet: Provide estimates of computational resources required to accomplish the proposed project. A completed DoD Frontier Project Resource Request (see Attachment 3; not part of 15-page limit) for each year of the proposed project is required. The form is divided into three sections:

- Section I: Specify the applicable year and enter the principal investigator information.
- Section II: There are two tables in Section II. The first table facilitates outlining suites of systems at various locations that can address the project's requirements. Proposals may present multiple scenarios (combinations of platforms and locations). The second table, which contains computational processor, memory, and data archive storage requirements, must be completed once for each year of the project.
- Section III: Enter the computational project titles and project numbers (as reflected in the HPCMP requirements database) associated with the project. Please contact Tameka Jones at require@hpc.mil if you need assistance with this.

Curricula Vitae: Provide a *curriculum vita* (including a list of relevant publications) for each of the key personnel. (**separate document**; not part of 15-page limit)

Attachment 1
Summary of Existing Frontier Projects

Validation of Turbulence and Turbulent Combustion Models for Air Force Propulsion Systems (Venkateswaran Sankaran, Air Force Research Laboratory)

The goal of this Frontier Project is the development, validation, and application of advanced turbulence and turbulent combustion models designed specifically for Air Force propulsion applications, including gas turbines, scramjets, and rockets. Reacting direct numerical simulations (DNS) and large-eddy simulations (LES) coupled with existing and new turbulence, combustion, and turbulent combustion modes will be evaluated using a hierarchy of unit physics, canonical and grand challenge problems in gas turbines, augmentors, rockets, and scramjets.

Prediction of Hypersonic Laminar-Turbulent Transition through Direct Numerical Simulation (Jonathan Poggie, Purdue University, sponsored by Air Force Research Laboratory)

The objective of this project is to improve the prediction of hypersonic laminar-turbulent transition, and consequently to improve the prediction of heating rates in hypersonic flight. It will predict acoustic noise and transition in conventional hypersonic wind tunnels to make these facilities more useful for vehicle design. Direct numerical simulation (DNS) of hypersonic boundary-layer receptivity will be performed to predict the acoustic noise spectrum radiated from turbulent boundary-layers on wind tunnel walls and examine the effects on boundary-layer transition of disturbances introduced from the free-stream and at the tunnel wall. With this new understanding of the effects of tunnel noise, conventional hypersonic wind tunnels will be useful for testing hypersonic vehicles in spite of this noise. This may would save the DoD the cost of a new hypersonic quiet facility, an investment of at least $20M with 5-10 years of development. The proposed work will impact several DoD programs in hypersonics, including the High-Speed Strike Weapon (HSSW).

Earth System Prediction Capability (Joe Metzger, Naval Research Laboratory)

The overall goal of this Frontier Project is to perform the R&D necessary to produce the Navy's contribution to the national Earth System Prediction Capability (ESPC). Specifically, this will be

our first operational global long-range coupled forecast system for the atmosphere, ocean, sea ice, and waves that extends beyond a week to a month or more. The core components of this ESPC system are the Navy's current global prediction models for seven-day forecasts. Data assimilation will also initially use the Navy's current separate atmosphere and ocean products loosely coupled via the coupled forecast model as a first approximation. We use multi-year re-analyses and re-forecasts to test and understand the system. The target for IOC is a 30-day ensemble forecast, but much of our testing will be with 45- or 60-day re-forecasts, since we expect to extend the range for FOC.

Integrated Computational Flight Simulation in Support of the Future Naval Capabilities Dynamic Interface Virtual Environment Program (Susan Polsky, Naval Air Warfare Center – Aircraft Division)

This Frontier Project's goal is to predict the limits of flight envelopes for rotorcraft landing on ships. The project will use CFD coupled with Manned Flight Simulator aircraft flight dynamics models to accurately predict the non-linear aerodynamics affecting helicopter performance and pilot workload due to coupling between atmospheric winds/ship air wake, dynamic control surface motion (as controlled by the aircraft flight control laws and autonomous pilot inputs), and aircraft motion relative to the ship. These models will be further developed, tested, and validated against wind tunnel and flight test data.

High-Fidelity Modeling and Simulation to Support Army Aviation Acquisition Programs (Andrew Wissink, Army Aviation Development Directorate, AMRDEC)

The goal of this project is to integrate the CREATE-AV Helios and Kestrel high-fidelity modeling and simulation tools into Future Vertical Lift acquisitions of interest to Army Aviation to demonstrate the impact of these tools for the acquisition of major defense systems by reducing cost, development time, and risk. The project will perform high-fidelity multi-disciplinary computational modeling and simulation for the Future Attack and Reconnaissance Aircraft (FARA), Future Long-Range Attack Aircraft (FLRAA), and Future Unmanned Air Systems (FUAS) acquisition programs in Future Vertical Lift (FVL), in order to characterize performance, loads, vibration, noise, and safety to inform decision teams. Frontier resources will enable high-quality computational analysis of these configurations with a high-resolution digital model before the expensive manufacturing and flight test phase of the acquisition. Because FUAS has a longer-term development cycle (scheduled DoD insertion FY27), the project will focus on newly envisioned applications of the current Gray Eagle UAS configuration presently used by the Army.

CVN 78 Modeling and Simulation Validation for Full Ship Shock Trial (FSST) Alternative (Tim McGee, Naval Surface Warfare Center – Carderock Division)

NAVSEA has been tasked by SECNAV's office with performing M&S in advance of the summer 2020 USS GERALD R. FORD (CVN 78) Full Ship Shock Trial (FSST) in an effort to

validate the Navy Enhanced Sierra Mechanics (NESM) software using blind, pre-trial predictions to support an FSST alternative. This task seeks to complete NESM simulations for all 3 planned FSST shots prior to the 2020 FSST. The NESM software will be validated against data that will be recorded during the next FSST, which will be conducted against the CVN 78 in late FY20. One hundred fifty shock response sensors will be installed on CVN 78 specifically for this effort, which will provide an ample data set against which to validate NESM for predicting equipment dynamic inputs under shock loading.

High-Fidelity Physics-Based Simulation of Kinetic and Directed Energy Weapons Integration Strategies for Future Air Dominance Platforms (Scott Sherer, Air Force Research Laboratory – Air Vehicles)

The goals of this project include development of robust flow-control options for integration of directed and kinetic energy weapon systems on future air dominance platforms, and demonstration of selected options on a representative maneuvering vehicle. To accomplish these goals, high-fidelity, unsteady CFD using primarily DDES to design and evaluate flow control options will be used. Novel script-based grid generation will be used to quickly develop and simulate new geometries. Overset grid techniques will be used to incorporate selected concepts onto vehicles and dynamic, moving grid simulations will be performed.

Whole Atmosphere NEPTUNE (P. Alex Reinecke, Naval Research Laboratory)

The major goal of this project is to use the NEPTUNE deep atmospheric model to develop and validate a high-resolution global numerical weather prediction system to support IOC and replace the existing Navy global NWP system. In addition, the project will develop and test a unique, whole atmosphere forecasting capability, extending from the Earth's surface to 500 km height with the goal of predicting thermospheric disturbances at unprecedented spatial and temporal scales. The work supports existing ONR, NRL, and DARPA projects by performing numerical experiments with NEPTUNE of the whole atmosphere. Hindcasts for 30-60 day periods at increasing horizontal resolution will be done to validate new physical parameterizations, data assimilation techniques, and ensemble predictions in NEPTUNE. The project is designed to support the U.S. Navy's capabilities to characterize the current and future state of the battlespace environment in order to ensure battlespace dominance in the 21st century.

Terminal Ballistics to Advance Army Modernization Priorities (Robert Doney, Army Research Laboratory)

The goal of this project is to advance survivability and lethality capabilities in support of Army modernization priorities. Using a variety of codes continuum and mesoscale simulations will be performed to optimize armor and lethal mechanisms, as well as evaluate and mature new protection concepts. Atomistic, microscale, and mesoscale simulations will be used to capture microstructural effects on energetic materials for improved prediction of detonative response, as

well as material discovery. This work is critical to advancing DoD capability in three of the U.S. Army's six Modernization Priorities: Long-Range Precision Fires, Next-Generation Combat Vehicle, and Soldier Lethality.

Direct Numerical Simulations of Turbulence at Hypervelocity Flight Conditions (Neal Bitter, Johns Hopkins Applied Physics Laboratory, sponsored by the Office of Naval Research)

The goal of this project is address the basic science of hypervelocity turbulent flow and the application of turbulence models for real flight vehicles. It will use direct numerical simulations (DNS) to identify and address deficiencies in existing turbulence models for aero-heating prediction, a key risk area for hypersonic vehicle design. DNS methods will be executed at flight-relevant conditions for both unclassified and classified vehicle designs. These predictions will be used to evaluate performance of Reynolds-Averaged Navier-Stokes (RANS) models. The results of these analyses will establish credibility and quantify uncertainty of RANS models for aero-heating and aerodynamic analyses to reduce uncertainty in predictions of these important quantities, which are critical to design of hypersonic vehicles for DoD programs.

Attachment 2
FY 2022 DoD Frontier Project Proposal Cover Page

FY2022 DoD FRONTIER PROJECT PROPOSAL COVER PAGE

Project Background		
Project Title:		
Project Type: either "Foundational Research and Engineering" or "Applied Acquisition and Sustainment"		
Requirements Project Number(s):	CTA(s):	Project Duration (in years):
Estimated Core-hours by year: FY22-	FY23- FY24- FY25-	
Government Sponsor		
Name:	Email Address:	
Organization:	Phone Number:	
Principal Investigator (may be the same as Government Sponsor)		
Name:	Email Address:	
Organization:	Phone Number:	
Key Collaborators		
Names & roles:		
Impact (Specify the impact of the project's outcomes to DoD, the warfighter, and the technical community)		
Technical Goals		
Technical Approach		
Major Applications Software (e.g., ANSYS CFD)		
Technical & Computational Challenges		
Cover material limited to one page – row heights may be adjusted to suit		

Attachment 3

DoD Frontier Project Resource Request

Submit a complete copy of the information in attachment 3 for each year.

DoD Frontier Project Resource Request

Section I: General Information

Project Number and Title: _____ Project Year: _____

Principal Investigator:

Name:_____ Service/Agency:____ Organization:

Address, City, State, and Zip Code: _____

_____

E-Mail Address: _____

Phone: _____

Section II: Overall Project Resource Requirements

Platform(s)	Location (DSRC)		CPU Resources (core-hours) GPU Resources (node-hours)	
	First Choice	Second Choice	Request	Minimum Acceptable

Platform(s)	Typical Number of Processors	Maximum Number of Processors	Typical Job Memory (GB)	Maximum Job Memory (GB)	Total Data Archive Storage Requirements (TB)

Total Expected Working Storage Requirements (in TB):_____

Annual Expected Archival Storage Requirements (per year in TB):_____

Section III: Requirements Project Information

HPCMP Requirements Database Information:

Project Title from HPCMP Requirements Database:_____

Project Number from HPCMP Requirement Database: _____