



# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

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## **EMBA PROJECT REPORT**

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### **Cost Benefit Analysis of EWTGLANT Forward Air Controller / Joint Terminal Attack Controller Training Options**

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**13 March 2013**

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14. ABSTRACT

**This Report was conducted for the EWTGLANT Director of Operations and Training and compares two COAs for Joint Terminal Attack Controller (JTAC) training at a Joint Staff accredited school to the standards specified for certification of individuals to control Close Air Support in the joint environment. The report includes two (2) years of quantitative data for aviation and other resources expended in support of JTAC training at EWTGLANT. The qualitative findings outline a choice between a vague output, idiosyncratic curriculum, and flexibly resourced program; and a specified output, codified curriculum, and less flexibly resourced program. The authors encourage immediate adoption of the codified curriculum because of its specificity, consistency, and reduction of flexibilities that adversely impact effective training. The reduced flexibility is identified as potentially unpopular but also as a bridge from an ambiguous and resource intensive paradigm of training to a future paradigm of unambiguous skills based training built on the Systems approach to Training (SAT). The alternative route is identified to have the potential to increase organizational flexibility to achieve training requirements through simulation with a potential cost savings of \$8.5 \$9.0 million annually while increasing the capability of the certified JTAC graduate.**

15. SUBJECT TERMS

**Close Air Support, CAS, FAC, JTAC, EWTG, EWTGLANT, TECOM, MCCDC, HQMC, USMC, Training, JCAS AP MOA, Certification, Joint, Simulation**

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## EXECUTIVE SUMMARY

The United States Marine Corps Title 10 responsibility of fielding combat-ready forces to the Geographic Combatant Commanders is an enormous, resource intensive responsibility. A United States Navy Formal Learning Center that supports this objective is Expeditionary Warfare Training Group, Atlantic (EWTGLANT). The Tactical Air Control Party (TACP) Course taught at EWTGLANT provides instruction in the individual-skill of Terminal Attack Control. Graduates of the TACP Course are certified as Forward Air Controllers (FACs) or Joint Terminal Attack Controllers (JTACs) and are identified across the Joint force to have met the minimum standards of the Joint Close Air Support - Action Plan - Memorandum of Agreement of which the Marine Corps is a signatory. EWTGLANT is responsible for ensuring courses offered meet the readiness needs of the operational forces through the development of course Programs of Instruction (POI) and Course Descriptive Data (CDD). These documents define course curriculum and organize allocated resources into standardized training designed to verify the presence of specified levels of readiness.

There is pending decision for the EWTGLANT TACP Course between continuation of a current curriculum and adoption of a proposed POI. A comparison between the current curriculum and proposed POI revealed the quantitative cost of training a single FAC / JTAC at EWTGLANT to be approximately:

- Current: \$155,588.42
- Proposed: \$114,977.28

However, the potential cost savings of the proposed POI incur increased Temporary Additional Duty (TAD) expenses for Training and Education Command (TECOM) of \$893.50 per student totaling approximately \$107,220.00 per year. TECOM is the decision authority.

An examination of qualitative costs revealed the choice between the current curriculum and the proposed POI is additionally a choice between vague rather than specified readiness output, idiosyncratic rather than codified curriculum, and retaining or abdicating flexibility. Terminal Attack Control in the Joint operating environment is an important combat capability with high profile consequences for failure. Vagary, inconsistency, and certain types of flexibility are generally undesirable. These characteristics exist in the current curriculum. Immediate

implementation of the proposed POI is recommended because of its specificity, consistency, and reduction of flexibilities that adversely impact effective training. Implementation of the proposed POI is the quickest path for EWTGLANT to definitively connect the resources and training required to reliably and repeatedly achieve a specified readiness level and produce a standardized initially certified FAC / JTAC.

The rigidity of this path will be unpopular with many stakeholders in the Marine Corps but the opportunity cost of maintaining the status quo is potentially large. The reduced flexibility incurred by adopting the proposed POI will likely serve as a bridge away from the current Joint community and Marine Corps paradigm of “controls” based training to a future paradigm of “skills” based training. Clearly specified readiness goals defined by skills and performance standards increase the flexibility to achieve the goal through alternate means such as simulation. The potential for reduced resource expenditure and more importantly increased combat effectiveness is enormous. The taxpayer demands nothing more and the individual Marine deserves nothing less.

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# INTRODUCTION AND BACKGROUND

## A. INTRODUCTION

The United States Marine Corps Title 10 responsibility to develop fully integrated Marine Corps warfighting capabilities and field combat-ready forces is an enormous resource intensive responsibility. The Marine Corps conducts this task through Headquarters Marine Corps, Marine Corps Combat Development Command (HQMC MCCDC) and the subordinate elements of Training and Education Command (TECOM) and Training Command.<sup>1</sup> The national and military budgetary environment is increasingly competitive. Maximizing the efficiency of resource utilization to conduct this task will be of paramount importance to ensure that the Marine Corps continues to be “most ready when the nation is least ready” while remaining a trusted custodian of the resources granted by the American people. A high-profile individual-skill taught within Training Command is the Terminal Attack Control of Close Air Support by Forward Air Controllers (FACs) and Joint Terminal Attack Controllers (JTACs) at Expeditionary Warfare Training Group, Atlantic (EWTGLANT.)<sup>2,3</sup> Terminal Attack Control is high-profile not only because of the oft-stated catastrophic consequences of failure, but also because of the resources consumed by the training.<sup>4</sup> Linking the resources required to achieve

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<sup>1</sup> TECOM is responsible for developing and resourcing the plans, policies, and programs intended to prepare the force to meet the challenges of the operational environment. Training Command is the Marine Corps proponent for MOS producing individual-skill standards based training. Training Command conducts training at numerous Formal Learning Centers and Marine Detachments.

<sup>2</sup> The importance of individual skills to unit combat effectiveness and the Formal Learning Center (FLC) role in preparing the individual Marine for the unit is expressed: “Individual training and the mastery of individual skills serve as the building blocks for unit combat readiness. A Marine’s ability to demonstrate the critical skills required in combat is essential. The mastery of individual skills begins with the evaluation of a Marine’s performance at the MOS-producing formal school.” (MCO 1553.3A, 2004, p. 11)

<sup>3</sup> FACs / JTACs are responsible for controlling Close Air Support. Close Air Support is defined as air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.

<sup>4</sup> The Joint force performance of Terminal Attack Control gained Congressional visibility and became the subject of General Accounting Office Report 03-505. The Report was requested in response to numerous Air-Ground fratricide incidents and identified “limited success in (DoD) overcoming the barriers that prevented troops from receiving the realistic, standardized close air support training necessary to prepare them for joint operations.” (United States General Accounting Office (GAO-03-505, 2003, p. 2) The report accelerated the implementation of the Joint Close Air Support (JCAS) Action Plan (AP) Memorandum of Agreement (MOA) – Joint Terminal Attack Controller (JTAC) (Ground.)

specified levels of FAC / JTAC individual readiness through structured training ensures military effectiveness and offers the possibility of long-term savings. <sup>5</sup>

## **B. BACKGROUND**

EWTGLANT is a naval command subordinate to Commander Strike Force Training, Atlantic (CSFTL) that serves as a Formal Learning Center (FLC). Its mission is to provide training to the operating forces of the Marine Corps, naval units, and coalition forces that operate alongside the Marine Corps. (EWGTLANT Course Catalogue, 2011) Several of the courses offered at EWTGLANT are Marine Corps centric. The funding, curriculum review, and curriculum approval of these courses is managed by TECOM through the review and approval of Marine Corps Training and Readiness (T & R) Manuals and course Programs of Instruction (POI). EWTGLANT's responsibility is to ensure that courses offered meet the readiness needs of the operational forces through the development of course POI and Course Descriptive Data (CDD). POI and CDD provide a detailed template of course execution and an estimate of resources required to execute the template to achieve specified levels of readiness.<sup>6</sup> The resources specified in POI and CDD compete for TECOM approval in an increasingly competitive budgetary environment.

The Tactical Air Control Party (TACP) Course is a MOS producing course taught to Marines, sailors, and coalition partners at EWTGLANT under the oversight of Training Command. Graduates are certified to conduct Terminal Attack Control per the Joint Close Air Support - Action Plan - Memorandum of Agreement – Joint Terminal Attack Controller

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<sup>5</sup> The importance to the Marine Corps of linking training activities to specified readiness levels and defining them with a cost was publically expressed at the November 2011 Interservice / Industry Training, Simulation and Education Conference (I/ITSEC) by CG TECOM. JTAC training was specifically addressed.(CG TECOM, Major General Fox - Comments in Flag Officer Panel at Interservice / Industry Training, Simulation and Education Conference (CG TECOM, Major General Fox - Comments in Flag Officer Panel at Interservice / Industry Training, Simulation and Education Conference (I/ITSEC), 2011, p. start 27 min 45 sec)

<sup>6</sup> CG TECOM is the approval authority. Training Command is responsible for submitting all Programs of Instruction for review, validation, resourcing, and approval from Training Command to TECOM every 2 years or within 120 days of T & R approval. (MCO 1553.2B, 2011, pp. 1-1 through 1-4) The detachments and Formal Learning Centers complete the updates and / or changes and route the products through Training Command

(Ground) [i.e. - JCAS AP MOA – JTAC (Ground)].<sup>7</sup> <sup>8</sup> The EWTGLANT staff produced a DRAFT POI for the TACP Course in response to the release of a new T & R Manual signed by CG TECOM 13 May 2011. The proposed POI is currently in staffing. This report is a Cost Benefit Analysis between two options of creating the link between resources, training, and readiness for the training of FACs / JTACs during initial certification in accordance with the Joint Mission Task List (JMTL) tasks of the JCAS AP MOA at EWTGLANT.

### **C. PROJECT OBJECTIVES**

The objective of this project was to provide a Cost Benefit Analysis (CBA) of two COAs:

- COA 1 - Conduct initial JTAC Certification training at EWTGLANT using the current POI.
- COA 2 - Conduct initial JTAC Certification training at EWTGLANT using the proposed POI.

In order to achieve the objective, the study focused on four specific questions:

1. What are the financial costs and benefits of the current curriculum?
2. What are the financial costs and benefits of the proposed curriculum?
3. What are the non-financial costs and benefits of the current curriculum?
4. What are the non-financial costs and benefits of the proposed curriculum?

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<sup>7</sup> The JCAS AP MOA specifies the minimum standards for JTAC certification and qualification (i.e. – “currency”) and states “each Service component has independently and voluntarily determined that it is in their Service’s best interest to meet or exceed the minimum standards for JTAC training and certification identified in the MOA.” Previous versions were signed in 2004, 2007, and 2010. The most recent version was signed 1 January 2012 by HQMC PPO and includes 17 United States DoD and international signatories. (JCAS AP MOA, 2012, pp. 1 - 3)

<sup>8</sup> Marines who graduate this course are designated with the secondary MOS of 7502 (all aviators) or MOS 8002 (all other Marines). Navy and International students are provided documentation that all requirements of the JCAS AP MOA have been satisfied. (JCAS AP MOA, 2012, p. 8)

## D. METHODOLOGY

The quantitative element of the CBA focused on the cost drivers deemed significant by the 2004 Center for Naval Analysis (CNA) Report: “The Total Cost for Non-Aviator Joint Terminal Attack Controller Policy.”<sup>9</sup> These cost drivers were:

- Aviation sorties.
- Non-Combat Expenditure Allowance (NCEA) (i.e. aviation ordnance).
- Ground Ammunition (i.e. Indirect Fire Ammunition).
- Temporary Additional Duty (TAD) funding. (Lambert, 2004)

Quantitative data of the current curriculum was obtained using EWTGLANT resource expenditure data from 1<sup>st</sup> quarter FY 11 through 4<sup>th</sup> quarter FY 12. Quantitative data of the proposed POI was obtained from the POI and CDD.

Qualitative data was obtained through Subject Matter Expert (SME) interviews. During these interviews the following questions were asked:

1. What is your role (or how are you a stakeholder) in the JTAC / FAC initial certification process as conducted at EWTGLANT?
2. As a SME (or stakeholder) in the process, what costs do you believe are associated with the proposed POI?
  - a. Financial / Quantitative?
  - b. Non-Financial / Qualitative?
3. Are there other less obvious costs that you believe are important?
4. By what metric do you measure the success of the current program and how is it tracked?
5. Are you aware of anyone else who uses this metric or any other to track the success of the program?

Interviews were conducted from all portions of the initial FAC / JTAC certification systems-process: inputs, processes, and outputs. They included representatives from the Marine

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<sup>9</sup> No POI & CDD was located that would have been referenced by CNA to obtain resource consumption estimates to compare to actual resource consumption. The 2004 report was sponsored by HQMC APP and requested in response to ALMAR 028/03 which implemented policy allowing non-aviator Marines who have “successfully completed a requisite training program to be certified as JTACs”. (ALMARS 028/03, 2013)

Corps and Navy organizations that receive EWTGLANT certified JTACs; resource providers, to include providers of aviation sorties, aviation ordnance, and ground ammunition; instructors (manpower); funding; and the Marine Corps and Navy agencies responsible for policy, structure, and assignment of FACs / JTACs to operational units.

## **E. PROJECT SCOPE**

The project focused strictly on initial certification training at EWTGLANT and the two COAs specified in the Project Objectives section. The following were not considered:

- Intermediate options to the current POI or the proposed POI.
- Cost of formal or informal pre-requisite training packages, such as “the 10<sup>th</sup> Marines JTAC Primer” conducted at Marine Corps Base Camp Lejeune, NC.
- Follow-on (“sustainment”) training within the fleet.
- Cost of the updated Distance Learning (DL) that is part of the proposed POI. This was due to the wide range of options that vary in price and quality from “fully contracted” to “internally maintained and self-updated.”
- Facilities maintenance of Close Air Support (CAS) ranges or costs associated with Marine Corps Installations Command (MCI) activities.
- Schoolhouse facilities overhead (N-4, N-6, N-9, etc.).
- Cost of assault support sorties (Rotary Wing Assault Support and Aerial Refueling Tanker sorties).
- Cost of placing supporting units in the field (Artillery Battery, Mortar Section, Direct Air Support Center (DASC) - Air Support Element (ASE)).

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## **II. RESULTS**

### **A. SYNOPSIS**

Data was gathered from the two POIs through research and interviews to identify the quantitative and qualitative aspects of each. A visual, tabular, and descriptive comparison is provided in the following section. The sections following the POI Comparison describe in increased detail the most significant costs and benefits identified during the study. The costs and benefits of the current curriculum are followed by the costs and benefits of the proposed POI. The theme of the results is that determination of the readiness level and the standard to be achieved is a pre-requisite for the determination of how to train, who to train, what to train, or what resources are required to train. The results section concludes with a summary and course of action comparison. Appendices include additional data and analysis.

### **B. POI COMPARISON**

1. Current POI: The cost per student is approximately \$155,588.42. No EWTGLANT TACP POI was located. In the absence of a EWTGLANT POI a comparison was conducted between the 2007 Expeditionary Warfare Training Group, Pacific (EWTGPAC) TACP POI, the TACP T & R Manual, and current execution of the EWTGLANT TACP Course. The 2007 EWTGPAC POI was used to determine how the course may have been intended to be conducted. The T & R Manual was used to identify resources. Archives and observation of course execution were used to determine how the course is conducted. (See Appendix B for detailed explanation) The following characteristics were identified:

- Unspecified readiness output achieves ~55% JM TL tasks.
- Academic hours have increased and academic practical application has decreased from the amount intended by the 2007 EWTGPAC POI.
- Enormous amount of flexibility for determination and utilization of required resources.

2. Proposed POI: The cost per student is approximately \$114,977.28. The proposed POI was designed via the Instructional Systems Design / Systems Approach Training (ISD / SAT) Process. The tangible product is a 358-page document with Knowledge, Skills, and Attitudes (KSAs) grouped into Enabling Learning Objectives (ELOs) structured into classes. It is targeted to a baseline Target Population Description (TPD) of a MOS 0861 Staff Sergeant. The proposed POI outlines training for clearly specified tasks and is organized into four phases which build upon each other. The four phases are: Planning; Planning and Briefing; and Planning, Briefing and Execution; and Live-Fire Evaluation. A defined level of “mastery” is mandated in each phase.<sup>10</sup> The proposed POI is ready for the Develop Phase of the ISD / SAT Process. The following characteristics were identified:

- No increase in live resources.
- Specified output achieves ~80% JMTL tasks.
- Increased academic hours and practical application over the current curriculum. An undetermined portion of academics will be additive practical application embedded into the instruction.
- Increased CAS related simulator hours and JTAC (Instructor) monitored student performance of Terminal Attack Control.
- Increased classification level.
- Requires more aviator instructors.
- Incurs reduced flexibility for determination and utilization of required resources.

The practical application hours identified on the schedule of the proposed POI were described as “pre-tests.” The academics of the proposed POI were described to have embedded instructor-led practical application intended to allow for the adult-learning sequence of instruction, practical application, and evaluation. The proposed POI has not completed the

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<sup>10</sup> The requirement for specified tasks and performance thresholds were highlighted in a 2006 Marine Corps Warfighting Lab (MCWL) study: “The USMC... must take steps to determine the tasks to be evaluated” and “develop a common set of JTAC performance standards with a strict baseline.” Due to the lack of a clear performance threshold the study developed its own JTAC performance evaluation methodology to evaluate student JTAC performance at EWTGPAC. It paralleled the United States Air Force (USAF) methodology which was determined to use a strict baseline. 30 percent of the candidates evaluated in 2006 were unable to successfully complete all of the tasks assessed by MCWL using this methodology. (MCWL Analysis Report 06-12, 2006, p. 2)

Develop Phase of the ISD / SAT Process and specific periods of practical application are not built into Master Lesson Files. The practical application hours of this type are not quantifiable and were not included in data tabulations.

Interviewees responsible for training FACs / JTACs universally inquired about increased hours of performance-based training (i.e. “doing”) within the new curriculum. They were apprehensive about the increased “academic time” but acknowledged increased complexities of the FAC / JTAC billet and the requirement for academic instruction to enable a student to properly “do.” Many interviewees also stated that significant academic hours were not required by all students. This is a product of a widely varied TPD.

A visual comparison of 2007 EWTGPAC POI, current curriculum execution, and the proposed POI course structures is provided in Chart 1. A tabular comparison of the current curriculum and proposed POI is provided in Table 1.

Chart 1. Comparison of 2007 EWTGPAC POI, Current Execution, and Proposed POI.

(Note: TAC is the acronym for Terminal Attack Control)

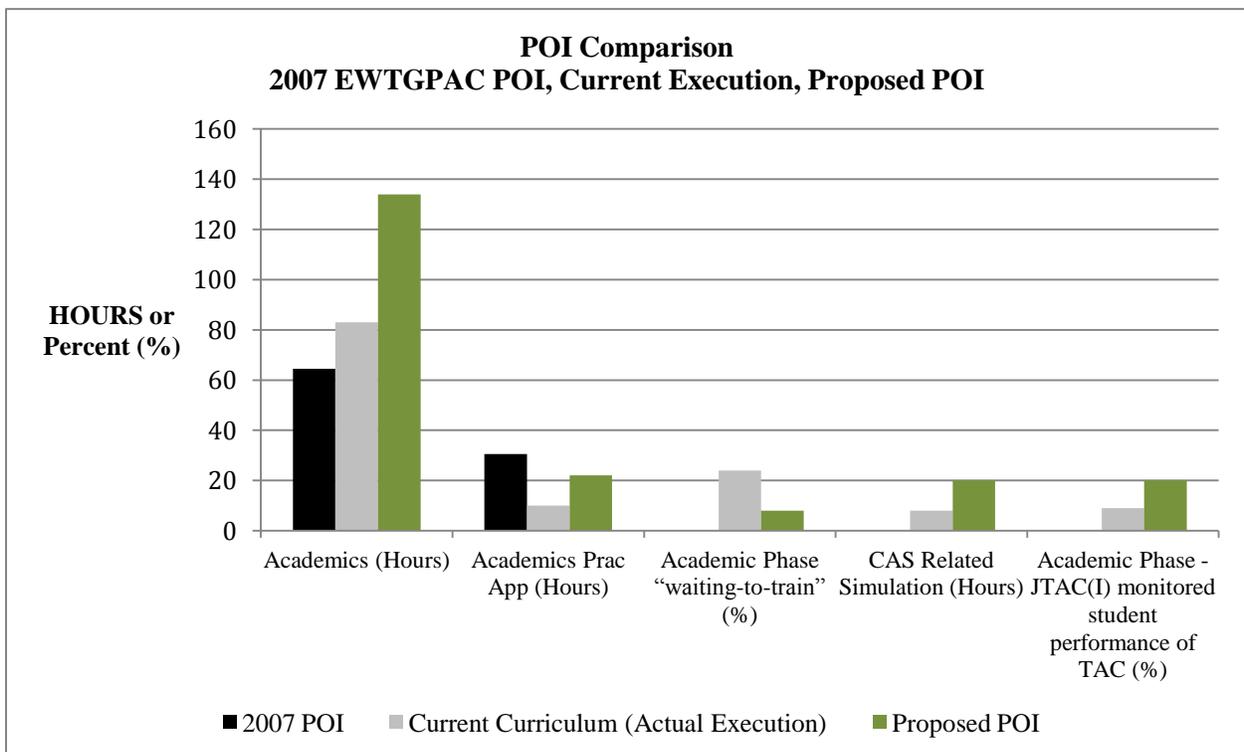


Table 1. Current Curriculum versus Proposed POI.

	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b>Number of Total Weeks</b>	4 Weeks - 15 days Academics / Simulator - 5 days “Live Fire”	5 weeks - 21 days Academics / Simulator - 4 days “Live Fire”
<b>Classification Level</b>	UNCLASSIFIED	SECRET-NOFORN
<b>Number of Instructors</b>	8 * EWTGLANT TACP currently has 3 instructors from CAS-providing platforms	10 *Aviators from CAS-providing platforms are critical to effectiveness of simulation presentations and prevention of negative transfer of learning to the student
<b>FY Student Capacity</b>	144	144
<b>JCAS AP MOA JMTLs Tasks Achieved</b>	~ 55%	~ 80%
<b>Academic Instructional Hours</b>	Average 84.20 hours Standard deviation of 7.85 hours	~ 134 hours
<b>Fluctuation of Academic Instructional Hours</b>	~ 29.5 hours Apex – 98.5 hours Nadir – 69 hours	Controlled by POI
<b>Practical Application Hours</b>	~ 10 hours	~ 22 hours - Additional Practical Application embedded with instruction
<b>Simulation Hours</b>	Average 7.86 hours Standard deviation of 0.95	~ 20 hours *Aviators from CAS-providing platforms are critical to effectiveness of simulation presentations and prevention of negative transfer of learning to the student
<b>Percentage of Academic Phase JTAC(I) monitored student performance of Terminal Attack Controller skills</b>	~ 9%	~ 20%
<b>Percentage of Academic Phase “waiting-to-train”</b>	~ 24%	~ 8%
<b>Written Exams</b>	1 Final Exam	3 Phase Exams Conducted at end of first 3 phases - Planning - Planning & Briefing - Planning, Briefing & Execution
<b>Performance Evaluation</b>	1 x TAC-CHK-1190	19 Performance Evaluations: 16 Conducted at end of first 3 phases: - 8 x Planning, - 4 x Planning & Briefing, - 4 x Planning, Briefing & Execution Comprehensive “Live Fire” evaluation: - 3 x 30 min Live-Fire evaluation

Table 1 (Continued). Current Curriculum versus Proposed POI.

	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b>Aviation Cost per-student</b>	\$78,393.40 - average FY11 & FY12 (See Appendix C)	\$58,809.22
<b>NCEA Cost per student</b>	\$13,839.12 *actual expenditure per student for FY 11 and 12 (See Appendix D)	\$19,819.38 * least expensive sourcing option
<b>Ground Ammunition Cost per student</b>	\$59,781.90 (See Appendix E)	\$31,881.18
<b>TAD Cost per student</b>	\$3,574.00 (See Appendix F)	\$4,467.50
<b>EWTGLANT Cost-per-JTAC</b>	<b>\$155,588.42</b>	<b>\$114,977.28</b>

3. Live Resources: The proposed POI is calculated to cost less due to reduced indirect fire ammunition expenditure and more efficient aviation resource expenditure. Systemic ground ammunition expenditure tracking issues do not allow accurate determination of ground ammunition expended in support of TACP and savings associated with ground ammunition may not materialize. (See Appendix E) Systemic aviation ordnance issues inhibit standardized resourcing of aviation ordnance for FAC / JTAC training. (See Appendix D) The “live-fire” portion of the proposed POI is executed with the same resource template as the current curriculum. An increase in live resources incurred by adopting the proposed POI is improbable. Savings associated with live resources in the proposed POI are predicated on aircraft sorties supporting no more than the EWTGLANT requested time-on station of 30 minutes per sortie. The average time on station for all sorties flown in FY 11 and FY 12 was 35.8 minutes. This increased the average aviation cost per FAC / JTAC. (See Appendix C).

A financial cost incurred by adopting the proposed POI would be an increase in Temporary Additional Duty funding of \$893.50 per student and \$107,220.00 per year. (See Appendix F for assumptions). The savings in live resources are possible. The increase in TAD costs by the ultimate POI decision authority, TECOM, is certain. This elevates the importance of the qualitative costs identified during the study. The current curriculum qualitative costs of potentially incomplete training, unspecified readiness level, and unspecified curriculum identified in the following section pertain to TECOMs mission and should be expressed by EWTGLANT to be certain they are considered with the financial cost.

## C. COA 1 – MAINTAIN CURRENT CURRICULUM – COSTS

1. Potentially Incomplete Training: The current curriculum conveys JCAS AP MOA certification after a FAC / JTAC has demonstrated “mastery” defined as “proficiency” for 55% of the JCAS AP MOA JMTL tasks. (LANT Current vrs DRAFT POI comparison xls, 2012) This is primarily due to students executing ~66% of the JMTL tasks with JTAC (Instructor) assistance during “live-fire” training. JTAC (Instructor) assistance fails to meet the JCAS AP MOA standard of proficient.<sup>11</sup> EWTGLANT TACP believes evaluation to the standard of proficient during all “live-fire” events would incur increased remediation rates and commensurate unacceptable increase of aviation sorties required.

The JCAS AP MOA standard of “proficient” appears appropriate. Interviewees from operational units indicated further training was most often required for new FACs / JTACs to be considered ready for combat. A small portion of interviewees indicated the requirement for further training was dependent on the Target Population Description (TPD) from which the newly certified EWTGLANT FAC / JTAC student originated.<sup>12</sup> Most interviewees expressed skepticism as to whether new FACs / JTACs universally received follow-on training prior to combat. There is potential EWTGLANT TACP is communicating a capability via JCAS AP MOA certification that has not been demonstrated to the joint communities specified level of “mastery.”

2. Unspecified Readiness Output: There is inconsistent guidance within the T & R Manual for the level of individual readiness expected of the EWTGLANT JCAS AP MOA certified FAC / JTAC. Different end-states found in the T & R Manual include:

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<sup>11</sup> Proficient is defined as “Trainee is able to accomplish all items in the task correctly and efficiently without assistance.” (JCAS AP MOA, 2012, p. 24)

<sup>12</sup> Target Population Description is the population from which a student is sourced. These comments specifically referenced aviators from platforms that conducted Close Air Support who were assessed to typically perform stronger at the conclusion of the current four-week course.

- “Combat Capable” (description of the EWTGLANT graduate).<sup>13</sup>
- Completed an “Exposure event” (facilitated by EWTGLANT as an FLC).
- “Certified” IAW the JCAS AP MOA (purpose of Core-Skills syllabus).

It was unclear how one evaluative event (TAC-CHK-1190) consisting of two Terminal Attack Controls satisfy the JCAS AP MOA standard of “proficient” that is specified for all performance-based JMTL tasks. An item of interest was the latitude granted unit commanders to “waive” the training required to create a “Combat Ready” FAC / JTAC. This is significant. The TACP T & R Manual prohibits a “Combat Capable” FAC / JTAC (i.e. EWTGLANT TACP graduate) from autonomously conducting Terminal Attack Control in peacetime training. However, authority is delegated to the unit commander to waive the “Combat Ready” training for participation in contingency operations or combat.<sup>14</sup> Conveying JCAS AP MOA certification at EWTGLANT unambiguously communicates the minimum acceptable standard of the Geographic Combatant Commander has been satisfied and reduces unit commander incentive to provide further training. This makes the EWTGLANT certified FAC / JTAC de-facto “Combat Ready.”<sup>15</sup> Many comments similar to the following quote were made regarding follow-on training: “Marines are doing what they can and trying to meet the intent of the T & R, but there is no perceived pressure to get the training complete because the ability of a unit commander to waive the training in order to deploy serves as a release valve.” The lack of a clearly specified readiness output and performance standard inhibits development of an effective training program

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<sup>13</sup> The terms “Combat Capable” and “Combat Ready” were removed from the Ground T & R Program in April 2005 but are still in the 2011 TACP T & R. (MCO 3500.72A, 2005, p. 4) These terms contributed to inconsistent interviewee interpretation of EWTGLANTs training responsibilities and the “readiness” expected of the FAC / JTAC graduate amongst stakeholders at all echelon-levels.

<sup>14</sup> This was identified by Center for Naval Analysis Study in 2004: “...the odd condition arises where the JTAC is authorized to conduct terminal control during wartime operations, as dictated by the JTAC MOA, but not during peacetime training, as constrained by the T&R Manual. The T&R Manual, which governs only peacetime training, states, “At the completion of the combat capable phase, the JTAC may conduct terminal control/guidance only under the direct supervision of a current 7502.” The intent of the T&R is to prescribe additional JTAC training prior to his being designated fully combat qualified, without imposing that additional training burden on a ground unit that needs to deploy rapidly.” (Lambert, 2004, p. 15)

<sup>15</sup> Interviewee answers to questions regarding FAC / JTAC readiness for combat operations were responded to with the least hesitation and most clarity by interviewees with negative responses. Affirmative responses by interviewees were generally hesitant and included qualifiers such as “I don’t like the question” and “no one is really ready.”

and makes identification of required resources exceedingly difficult. Furthermore, a training “requirement” waived absent oversight is not a requirement.<sup>16</sup>

3. Unspecified Curriculum: The current curriculum is an idiosyncratic program with no POI or CDD. It provides the equivalent of about 11.2 eight-hour-training days during an academic phase (15 days) and about 11.79 eight-hour-training days during the total course (20 days). Students “wait-to-train” approximately 25% of the academic time and approximately 41% of the total 4-week course.

The 2007 EWTGPAC Interim Approved POI, TACP T & R Manual, observation of the course, and review of historical course schedules were used to determine the EWTGLANT TACP “documented” and “actual” curriculum. No document was found that organizes the resources of the T & R Manual into the training required to achieve the JM TLs of the JCAS AP MOA to the standards specified.<sup>17</sup>

The absence of POI and CDD inhibit implementation of a persistent curriculum that can withstand instructor staff turnover. This is demonstrated via a comparison of two periods separated by a significant turnover of instructor personnel that occurred in the summer of 2010. Changes to the course were implemented by a new TACP instructor cadre between October 2010 (TACP 1-11) and October 2011 (TACP 1-12.) The entire period of the “4-week course” was compared to a period of stability identified within the data between October 2011 (TACP 1-12) and February 2013 (TACP 2-13) (See Appendix B for methodology and additional data):

For the entire period of the current “4-week TACP course” curriculum - October 2007 to February 2013:

- Average academic hours were 84.20 hours with a standard deviation of 7.85.
- Average simulator hours were 7.86 hours with a standard deviation of 0.95.

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<sup>16</sup> All interviewees among operational units were aware of existing waivers. No interviewee was aware of any tracking mechanism with any HHQ. We received the following vignette:

“When I most recently deployed to Afghanistan, our unit had JTACs who were not complete with the Combat Ready Syllabus. We submitted our unit waiver letters to the RC-SW FECC / JTAC Program Manager who did not express concern or understanding as to what the waiver truly meant. Justification for each individual controller and what and why the training was missing was offered up but no follow-up was requested.”

<sup>17</sup> The appropriate standard of ISD / SAT “mastery” is understood by EWTGLANT to be the individual Marine being “proficient” in the 47 performance evaluated JM TL tasks and demonstrating “Understanding” in 41 knowledge based JM TL tasks listed in the JCAS AP MOA. (JCAS AP MOA, 2012, p. 21)

- Academic hours fluctuate from an apex of 98.5 hours to a nadir of 69 hours for a 29.5 hour window of fluctuation.
- Simulator hours fluctuate from an apex of 10.17 hours to a nadir of 6.27 hours with a 3.9 hour window of fluctuation. Note- the 10.17 was an “outlier” with the next highest data for the period 9.0.

For the period of stability identified in the data - October 2011 (TACP 1-12) to February 2013 (TACP 2-13):

- Average academic hours were 84.23 hours with a standard deviation of 1.38.
- Average simulator hours were 8.16 hours with a standard deviation of 0.27.
- Academic hours fluctuate from an apex of 83.25 hours to a nadir of 79.5 hours for a 3.75 hour window of fluctuation.
- Simulator hours fluctuate from an apex of 10.17 hours to a nadir of 7.94 hours with a 2.23 hour window of fluctuation. Note- the 10.17 was an “outlier” with the next highest data for the period 8.67.

Table 2 provides a tabular comparison of the entire period of the 4-week course with the most recently executed EWTGLANT TACP Course (TACP 2-13 - February 2013).

Table 2. Academic Comparison by Time Period.

Note: EWTGPAC “4 week” POI dated Oct 2007 specifies 65 Hours of Academics (34.5 Lecture / 30.5 Practical Application)	TACP 1-08 through 2-13 (Period of 4 week Course)	TACP 1-12 through 2-13 (Period of ~Stabilization of Current Curriculum)
<b>Average Academic Hours / Student</b>	84.21	81.53
<b>Standard Deviation</b>	7.85	1.38
<b>Average Simulator Hours / Student</b>	7.86	8.3
<b>Standard Deviation</b>	0.95	0.27
<b>Academic Training Days (Equivalent “8 hour” training days)</b>	11.51	11.23
<b>% student time “waiting to train” - Academics</b>	23.27%	25.14%
<b>Live Fire Training hours</b>	4.5 hours	4.5 hours
<b>Total Effective Training Days (Equivalent “8 hour” training days)</b>	12.07	11.79
<b>% student time “waiting-to-train” - Total</b>	39.64%	41.04%

A stable FAC / JTAC training program structured to achieve specified readiness outputs will not likely be attainable with the current curriculum. However, the absence of specified readiness outputs and tolerance for instability permits a great deal of potentially desirable flexibility. This is a benefit of the current curriculum.

#### **D. COA 1 – MAINTAIN CURRENT CURRICULUM – BENEFITS**

1. Flexibility: The current program retains an enormous amount of flexibility due to the lack of specificity regarding readiness output, curriculum, or required resources. Examples of flexibility within the T & R Manual include:

- 57% (4 of 7) events with live aircraft allow either Fixed-Wing or Rotary-Wing aircraft.
- No events with live aircraft mandate ordnance. All allow live (high explosive), heavy-inert, or light-inert ordnance options.
- 54% (6 of 11) of the Close Air Support (CAS) simulator events do not specify mandatory pieces of ordnance.
- 67% (7 of 11) of the CAS simulator events do not specify JTAC equipment

The intent of the flexibility in the simulator events was indiscernible. There were no significant variations of conditions presented to the students during simulator events as currently conducted at EWTGLANT. The simulator was designed with the intent to set conditions for standardized training and appears to be used in that manner. There were observations of instructors “role-playing” aircraft they had not flown resulting in negative transfer of learning to the student and time was spent “un-doing” the training. There was no significant variation in the conduct of the “live-fire” events among EWTGLANT students.<sup>18</sup> The current level of standardization of the “live-fire” portion of the current curriculum is not assured. The T & R Manual retains flexibility for “live-fire” resources “in case it is needed” in order to increase the likelihood of completing the number and type of controls specified by the JCAS AP MOA in the case of reduced aviation,

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<sup>18</sup> The EWTGLANT “live-fire” is conducted in 3 standardized scenarios. Each is provided to the student 30 min prior to A/C TOS and are designed to integrate all T & R live events and the maximum number of JMTL tasks. The student is authorized assistance on the first two of the three. EWTGLANT has been requesting and receiving support in a manner that facilitates this training template since October 2011. It is the “live-fire” template for the proposed POI. This training requires an increase in resource rigidity to ensure the conditions required to train (or evaluate on the third event) are established. This contrasts with the flexibility afforded by the T & R Manual.

aviation ordnance, or ground ammunition resources. The following comment made by a resource provider expresses the perceived benefit of this type of flexibility: "...the main concern from the (resource provider) perspective is retaining flexibility in the (JTAC certification) program to produce the maximum number of qualified JTACS during a time when the requirement remains high (read IAs etc.)."

The flexibility of the current curriculum allows it to readily absorb production pressures, resource reductions, or adjust for time constraints. This benefit reduces the risk of a complex production system failing to provide scheduled delivery of the low-density / high-demand capabilities provided by FACs / JTACs to the operating forces.

The increased specificity of resources within the proposed POI would require giving up this type of flexibility. Additional costs of the proposed POI are the potential for incomplete training due to insufficient ISD / SAT Front End Analysis and an increase in TECOM funding required for student TAD.

## **E. COA 2 – ADOPT PROPOSED CURRICULUM – COSTS**

1. Potentially Incomplete Training: The proposed POI would convey certification after a FAC / JTAC had demonstrated "mastery" defined as "proficiency" in 80% of the JCAS AP MOA JMTL tasks. (LANT Current vrs DRAFT POI comparison xls, 2012) JMTL tasks not related to Terminal Attack Control (i.e. achieving kinetic effects with aviation fires) were omitted with few exceptions. The decision by EWTGLANT TACP to accept "80% achievement" during the curriculum development process was said to be resource driven. The time required to achieve 100% of the JMTL tasks during the conduct of the ISD / SAT process exceeded the level assumed to be acceptable by other stakeholders. The "100%" answer was never identified.

2. Potentially insufficient ISD / SAT Process Front-End-Analysis: There is ambiguity regarding the level of readiness specified for an EWTGLANT graduate by the T & R Manual and variation of SME opinion regarding the requirements of a FAC / JTAC at all echelons. Many FAC / JTAC requirements expressed by SME stakeholders did not involve Terminal

Attack Control and are not covered to any level of “mastery” in the current curriculum.<sup>19</sup> The May 2011 Course Content Review Board (CCRB) attendance roster indicates limited operational force participation. The missions and operating environments of units are varied. It is likely the requirements of the FACs / JTACs assigned to these units will differ. Unique unit requirements may not have been expressed at the CCRB and skills expected of an initially certified FAC / JTAC may have been omitted from the proposed POI. Inaccurate specification of the readiness requirement would likely result in inaccurate identification of the required training and resources within the proposed POI.

3. Specified Resource Requirement: Codification of aviation sorties, NCEA, and ground ammunition required to set standardized conditions for “live-fire” training within the proposed POI will remove the flexibility afforded all resource stakeholders. (See Appendices C, D, and E for data and analysis).

4. Increased TAD Costs: The proposed POI would incur an increased cost of approximately \$893.00 per student, \$17,870.00 per class, or \$107,220.00 per year in TAD funding by TECOM. (See Appendix F for assumptions)

- TECOM finances Marine student TAD costs.
- Navy students are no cost to TECOM.
- International students are no cost to TECOM.

TECOM is the approval authority for the proposed POI. The decision to approve the proposed POI is also a TECOM decision to increase financial obligations during a period of budgetary strain. However, the additional TAD cost paid by TECOM is the cost required to establish a defined link between a specified readiness level and structured training through specified resources. A potential financial benefit of this expense is an accurate cost estimate of FAC / JTAC training.

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<sup>19</sup> Examples included assault support planning, submitting Aviation Support Requests (ASRs) & Joint Tactical Airstrike Request (JTARs) and serving as a SME for the 6-functions of Marine Aviation to the Ground Combat Element. (The 6 functions of Marine Corps Aviation per MCWP 3-2 are: Offensive Air Support, Anti-Air Warfare, Assault Support, Air Reconnaissance, Electronic Warfare, and Control of Aircraft and Missiles).

## **F. COA 2 – ADOPT PROPOSED CURRICULUM – BENEFITS**

1. Accurate Cost Estimate: The defined readiness level of the proposed POI mandates the training provided by the school facilitates student achievement and school verification of the standard.<sup>20</sup> A capability not verified is a capability assumed. Specific resources are required to create standardized training conditions to conduct the tasks of training and verifying. Specific resources also enable accurate identification of cost. Additionally, the standard becomes the goal rather than expenditure of specific resources without clearly defining how the resource will be used. The increased rigidity of the standard to be achieved provides flexibility to seek alternate training venues to achieve the standard.

Tracking resource expenditure during training allows identification of efficiencies regarding the training and resource support. EWTGLANTs standardized “live-fire” training plan of the type to be used in the proposed POI has enabled detailed monitoring of training plan execution and tabulation of integrated data throughout FY 11 and FY 12. The resource expenditure data enabled calculation of quantitative value of resources expended against the training conducted. Data of this type was unavailable for the CNA study conducted in 2004.<sup>21</sup> The quantifiable elements of this report would not have been possible without this data.

## **G. SUMMARY**

The 2004 Center for Naval Analysis Study identified aviation sorties, aviation ordnance, and ground ammunition as the most significant cost drivers for FAC / JTAC training. This continues to be the case and the proposed POI appears to offer savings in all three categories.

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<sup>20</sup> The POI and CDD are important tools for EWTGLANT to link the resources to the readiness achieved by the training of the TACP Course specifically because of the current TACP T & R fails to do so: “T&R Manuals are used to evaluate a Marine’s proficiency in the tasks required for a specific Military Occupational Specialty (MOS). They outline the structure for an individual training program based upon a logical progression of increasingly more challenging events. They define the events to be accomplished under specified conditions, and describe the requirement for periodic revalidation of proficiency.” (MCO 1553.3A, 2004, p. 11)

<sup>21</sup> The CNA Report stated: “After much effort devoted to collecting historical data, we found them insufficient, in both quality and quantity, to develop statistically rigorous point, or interval, estimates. While we developed an appropriate methodology, the robustness of the resulting estimates was inhibited by the paucity of the data. As better data become available, our methodology can be repeated to generate more statistically robust and refined estimates.” (Lambert, 2004, p. 9)

The resource intensive “live-fire” portion of the proposed POI is structured with the same resource template as the current curriculum. Errors in resource comparison would at worst result in spending at current levels for the three most significant resources. However, the relatively modest increase in TAD funding may appear large to TECOM who would incur the cost and is the decision authority. The negligible risk of increased cost, the potential for savings, and the certainty of increased compliance with the ISD / SAT Process should elevate the importance of these qualitative aspects of this decision. The decision between the current and proposed curriculum is essentially a choice between clearly defining the link between resources, training, and readiness or retaining the flexibility and ambiguity of the current curriculum. See Table 3 for a summary comparison of these COAs.

Table 3. COA Comparison.

COA	COST	BENEFIT
<b>Maintain Current Curriculum</b>	<ul style="list-style-type: none"> <li>• Potentially Incomplete Training</li> <li>• Unspecified Readiness Output</li> <li>• Unspecified Curriculum</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility</li> </ul>
<b>Adopt Proposed Curriculum</b>	<ul style="list-style-type: none"> <li>• Potentially incomplete Training</li> <li>• Potentially insufficient ISD / SAT Process Front-End Analysis</li> <li>• Specified Resource Requirement</li> <li>• Increased TAD Costs</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate Cost Estimates</li> </ul>

### **III. RECOMMENDATIONS AND CONCLUSION**

#### **A. RECOMMENDATIONS**

The EWTGLANT TACP Course remains a resource intensive, idiosyncratic, unstable curriculum with resources subject to the external pressures of multiple resource providers and stakeholders. This is a tenuous position in a period of budgetary strain. The proposed POI provides a more structured training program using specific resources for a FAC / JTAC to achieve a specified readiness level. Aspects of the proposed POI which were not identified as unambiguously more beneficial than the current curriculum can be traced directly to a lack of a clearly defined EWTGLANT output, readiness level, or standard to be achieved by the training. The requirement must be a carefully defined “target” in order to assess POI failures or successes or to build a future alternative POI.

Given the differences summarized in Table 3, two recommendations become clear:

**1. RECOMMENDATION 1 - ADOPT PROPOSED POI.** This is the quickest path towards unambiguous identification of resources necessary to conduct the training required to achieve the assumed readiness demanded of the operating forces. A Formal Learning Center does not appear to have other short term options absent locating an existing POI and CDD from which to immediately initiate the Develop Phase of the ISD / SAT Process. This action opens the possibility of increased training and evaluation with simulation assuming the simulator supports setting the training conditions required for the specific skills to be trained.

**2. RECOMMENDATION 2 - DEFINE THE REQUIREMENT.** Initiating a second iteration of the ISD / SAT Process from the Analysis Phase is an alternate path if the proposed POI is deemed insufficient. Disciplined, patient execution of the ISD / SAT process will likely determine the requirement and performance thresholds. Curricula developed with the ISD / SAT Process are only as effective as the outcome requirements upon which they are built. The absence of input from engaged and informed operational force representatives will limit ISD / SAT effectiveness. This option is not without cost and will take 18 – 24 months.

## B. CONCLUSION

A review of previous Marine Corps TACP T & R Manuals, interview comments, and direct observation strongly suggests the presence of an institutionalized “controls based” paradigm of FAC / JTAC training and cognitive inertia that may be difficult to overcome.<sup>22</sup> The Joint community paradigm of FAC / JTAC training is also decidedly “controls based” with no connection between the 12 controls specified in the JCAS AP MOA and the achievement of the 88 JMTL tasks to the specified standards.<sup>23</sup> It is unclear why a Joint standards document specifies the manner in which the standard is achieved. “Chasing controls” rather than quality training was identified as a concern over 6 years ago by Marine FACs / JTACs in the 2006 MCCDC Operational Analysis Division (OAD) Study: The Application of Simulators and Simulation in JTAC Training.<sup>24</sup> The proposed POI takes a different approach – one that can best be described as “skills based.” The increased rigor of the proposed POI and the rigidity applied to the resources used in training are designed to create the conditions required to evaluate specific skills to specified standards and produce a defined outcome at the conclusion of the training.

Both the current curriculum and the EWTGLANT application of the ISD / SAT Process to create the proposed POI were flawed due to the JCAS AP MOA requirement to conduct “12

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<sup>22</sup> A “controls based” paradigm implies focusing on a number of controls vice quality of training and skills performed to a universal standard. Characteristics of this paradigm include: Normalization of FACs / JTACs not controlling Fixed Wing live HE ordnance prior to combat deployment, normalization of waivers at the unit commander level, “one-stop” JTAC certification at the EWTG after “12 controls”, pairing Types of Terminal Attack Control with risk (and / or FAC / JTAC experience level), an expression of “a Type I, basic bombs-on-target JTAC” without being able to clearly define what capability that term specified, and training being described as “running 9-lines” without further description of specific skills exercised.

<sup>23</sup> It is not clear how 12 controls (i.e. resources) are linked to the achievement of the standards specified in the MOA for all 88 JMTLS. We were unable to determine the origins and were told at one point: “It was the sum of the one control per month a FAC needed to receive in Vietnam to retain currency.”

<sup>24</sup> Quote: “The theme of (251 JTACs worth of comments) is that JTACs are far more concerned on achieving a level of proficiency needed to operate successfully in combat, and are not satisfied with meeting a required number of currency controls. Further, the quality of the controls is more important than the actual number of controls. The data show that (in 2006) JTACs are getting the required number of controls, but the resources may not exist to put together more advanced controls...” (MCCDC OAD Study, 2006, pp. section 4 - pg 24) Many of the comments and much of the study appear to remain applicable.

live controls.”<sup>25</sup> These live controls are executed on restrictive ranges that produce a negative transfer of student skills. Interviewees universally reported that increasingly restrictive Air-Ground ranges and perceived “bureaucracy” governing Air-Ground ordnance delivery inhibit quality training. These comments referred to the ranges where EWTGLANT TACP conducts the “live-fire” portion of their course and are additive to restrictions identified by Marine Corps pilots in the May 2003 GAO Report 03-505.<sup>26, 27 and 28</sup> The following quote was typical of many comments regarding CAS training at G-10: “No one that that can train anywhere else trains here.” Continuing down the path of a “controls based” FAC / JTAC training paradigm with readiness requirements poorly defined by stakeholders and training conducted on increasingly restrictive ranges undermines basic readiness. The proposed POI offers another way to approach the problem.

A fresh examination of the skills identified in the proposed POI with particular attention to the “live-fire” execution template offers alternate venues to achieve the same or increased levels of readiness with reduced resource expenditure. The proposed POI is a gateway to simulation. Even so, the following caution is suggested by a recent study: “...the linkage between simulator training and live performance in combat is difficult to quantify or predict. The difference being, unlike combat, —No one is ever scared, hurt or killed in or by a simulator.” (JACOBS, 2011, p. 63) Properly constructed FAC / JTAC training with live ordnance (high explosive, not light inert) cultivates an “attitude” of aggression balanced with caution, tempered

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<sup>25</sup> The ISD / SAT Process for the proposed POI was flawed because a specific resource (12 controls) was specified vice enabling the process to determine exactly what was to be taught, and enabling a thorough examination of all media with which to teach. Another example of a flaw in the process was the requirement to fit the “live-fire” training into the airspace and impact areas of the local CAS training ranges. This prevented (and prevents) live ordnance employment and many common aircraft weapons delivery profiles that the FACs / JTACs could see during combat operations.

<sup>26</sup> Quote from the GAO 03-505: “Marine Corps pilots at units we visited echoed the concerns voiced about range restrictions and the lack of varied training opportunities.” The comments were directed at G-10 at Camp Lejeune, NC; BT-11 near MCAS Cherry Point, NC; and Navy Dare Range in NC. (United States General Accounting Office (GAO), 2003, p. 13)

<sup>27</sup> The “increased restrictions” included comments on Weapons Danger Zone (WDZ) software. A sample statement expressed that WDZ had reduced available Final Attack Headings for light inert Laser Guided Training Rounds (LGTR) at the G-10 impact area at Camp Lejeune, NC to parameters that are no longer useful for JTAC training. EWTGLANT ceased LGTR usage for TACP training prior to TACP 1-13 in October 2013.

<sup>28</sup> EWTGLNAT records show 46% of all FY 12 Terminal Attack Control was “dry” (no ordnance delivered) due to range restrictions at the Close Air Support range where training is conducted. Of that total, 100% of Fixed-Wing ordnance was inert. No target upon which light-inert ordnance was employed was closer than ~1100 meters. Upon hearing this, an interviewee expressed surprise and commented: “We are expending a lot of live resources creating a simulator.”

by judgment and experience, which accompanies the “knowledge” and “skills” acquired in training.<sup>29</sup>

Focusing on specified skills and clearly defined performance thresholds rather than “controls” offers the potential to reduce some portion of the training and evaluation currently conducted with live resources. The 12 controls specified in the JCAS AP MOA seem to be an arbitrary number intended to produce readiness, but now seem to be an ineffective, unaffordable training method in a time of increasing budgetary constraints. Clear definition of the readiness requirement and careful examination of all available resources should identify a more cost efficient method to produce combat effectiveness. The taxpayer demands nothing more and the individual Marine deserves nothing less.

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<sup>29</sup> FACs/JTAC interviewed universally expressed it was necessary to see Fixed Wing delivered High-Explosive ordnance (500#) prior to combat. A majority were aware of FACs/JTACs who had not. Some had deployed within weeks of graduating from EWTGLANT:

\*\* Interview comment: “Real is real HE (500# plus), real close (<300 meters), and real lonely.” The lonely was in regards to no one being available to QA FAC / JTAC actions and was expressing that as Air Officer monitoring the TAD frequency will not “catch” all the mistakes that could result in fratricide and / or negative outcomes.

\*\* Interview comment: Regarding his first experience with live ordnance: “The first time I controlled live Fixed-Wing ordnance (500#) was in combat on a target at 300 meters, and I never approached it the same again.”

## APPENDIX A

Table A - 1

<b>Live Resource Requirement - Current curriculum and Proposed POI</b>		
* submitted to MARFORCOM ISO one EWTGLANT TACP "Live-Fire"		
* Navy sorties sourced via informal agreement. Details of arrangement exceed project scope.		
<b>Live Resource Requirement</b>	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b>Requirement*</b>	<b>Status Quo from FY11 &amp; FY12</b>	<b>No Change</b>
<p><b>Total</b></p> <p><b>Breakdown:</b></p> <p><b>Fixed Wing (Day)</b></p> <p><b>Fixed Wing (Night)</b></p> <p><b>Rotary Wing (Day)</b></p> <p>* The "requirement" provides each of 24 students one OPPORTUNITY to complete the training goals associated with the event. O/H accounts for CNX (WX &amp; MTC) and remediation.</p>	<p>72 FRAGS (144 Sorties + O/H)</p> <p>24 FRAGS (48 Sorties) + O/H</p> <p>24 FRAGS (48 Sorties) + O/H</p> <p>24 FRAGS (48 Sorties) + O/H</p>	No Change
<p><b>Request (Requirement + O/H**)</b></p> <p><b>Total</b></p> <p><b>Breakdown:</b></p> <p><b>Fixed Wing (Day)</b></p> <p><b>Fixed Wing (Night)</b></p> <p><b>Rotary Wing (Day)</b></p> <p>** The current Air Support Request Feasibility-of-Support is submitted with 33% O/H (8 FRAGS / 16 Sorties) per event for 25% (24 FRAGS / 32 Sorties) Total O/H</p>	<p>96 FRAGS (192 Sorties)</p> <p>32 FRAGS (64 Sorties)</p> <p>32 FRAGS (64 Sorties)</p> <p>32 FRAGS (64 Sorties)</p>	No Change
<b>Apportionment</b>		
<p><b>Fixed Wing</b></p>	<p>24 FRAGS (48 Sorties) U.S. Navy (25% / 37.5%)</p> <p>24 FRAGS (48 Sorties) Contract CAS* (25% / 37.5%)</p> <p>16 FRAGS (32 Sorties) USMC (16.7% / 25%)</p> <p>* Note: Contract CAS TECOM OCO funded</p>	No Change
<p><b>Rotary Wing</b></p>	<p>32 FRAGS (64 Sorties) USMC (33.3% / 100%)</p>	No Change

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## APPENDIX B

**Unspecified Curriculum:** The search for a current EWTGLANT POI and CDD was unsuccessful. The following documents were found:

- **13 June 2007 - Interim Approved T & R Manual (Effective 01 October 2007)**
- **23 October 2007 - Interim Approved EWTGPAC POI<sup>30</sup>**
  - The cover letter states “course materials at EWTGPAC and EWTGLANT mirror each other to the greatest extent possible allowing for differences resulting from different training resource levels.” This was the only POI & CDD located. EWTGPAC was the “lead schoolhouse” until the release of MCO 1553.2B in April 2011 which directed schools teaching separate curriculum would submit individual POI & CDD for review and approval simultaneously. (MCO 1553.2B, 2011) Due to the relationship of the “sister schools” of EWTGLANT and EWTGPAC that existed for POI & CDD routing and approval in October 2007 and lack of any other document it was assumed this was the most current. It did not specify EWTGLANT resources.
- **08 October 2008 – CG TECOM signed T & R Manual**
- **May 2009 – Course Content Review Board (CCRB)**
- **18 September 2009 – OCCLFD 08 (Artillery) Front-End Analysis Report**
  - The report documented an FEA of all 08XX MOS. The purpose of the project was “simply to validate the current OCCFLD 08 Training and Readiness events.” An Occupational Analysis was not conducted. One Marine was identified as holding BMOS 8002, and 5 Marines were located for the survey conducted by TECOM. “Due to the low density population of this MOS 8002, a Training Analysis was not conducted.” MOS 8002 (JTAC) did not receive an FEA due to absence of both the

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<sup>30</sup> The Interim Approved POI was submitted in response to the Interim Approved T & R Manual dated 13 June 2007. The cover letter for approval indicated “When the final TACP T & R Manual is approved and this POI subsequently revised, CG TECOM will forward a copy to the American Council on Education.” (EWTGPAC Int POI & CDD, 2007, pp. 1 - 3) The organization was not contacted.

Occupational Analysis and the Training Analysis. (FEA Report 2009, 2009, pp. 1,2 and 9)

- **13 May 2011 – CG TECOM signed T & R Manual**
- **May 2011 - Course Content Review Board (CCRB)**
  - The ISD / SAT Process Analysis Phase data of the proposed POI was presented to the attendees. The Develop Phase continued until approximately May 2012.

The last Front-End Analysis was conducted in 2005 during the early development of the 2007 EWTGPAC POI. Three events requiring submission of POI and CDD are documented but no POI & CDD are available. Resources are specified in the T & R Manual but the manual lacks academic curriculum and no detail is included as to how the resources are to be organized to achieve the end-state of a JCAS AP MOA certified FAC/ JTAC.

A comparison was conducted between the 2007 EWTGPAC Interim Approved POI & CDD and the TACP T & R Manual dated 13 May 2011. The 2007 EWTGPAC POI classes are outdated, the number-of-hours of academics significantly less, and the number of hours of practical application significantly more than observed during the contemporary EWTGLANT TACP class. A likely contributor to the lack of a EWTGLANT POI is a letter from Deputy AC/S G-3 to EWTGPAC dated 23 June 2010. The letter was drafted in response to the EWTGLANT and EWTGPAC expression of concern regarding sustainment of an ongoing JTAC production surge to be continued through FY 11. The letter recognized the increased production requirement absent additional resources during the three year period beginning FY 09 through the end of FY 11.<sup>31</sup> Prior to April 2011 EWTGPAC was the “lead schoolhouse” responsible for POI submission. The increased FAC / JTAC production identified in the letter would also have impacted EWTGLANT. Relieving the requirement of the “lead schoolhouse” to conduct “requirements impacting POI” stymied the production of a EWTGLANT POI and CDD.<sup>32</sup>

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<sup>31</sup> The production demands were: developing and initiating instruction of JFO curriculum in late FY 08 through FY 09; increasing production of JTACs from 18 per-class to 21 per-class in FY 09; further increasing production of JTACs from 21 to 24 per class in FY 10. The letter expressed “...this current situation may impact admin readiness through FY 11. You are directed to continue to focus on JTAC and JFO production; administrative training requirements impacting Programs of Instruction are waived through FY11.” (AC/S G-3 Letter to PAC dtd 23 Jun 10, 2010)

<sup>32</sup> MCO 1553.2B removed the lead schoolhouse requirement in April 2011, but stated “For courses taught at multiple locations, the mirrored schools will submit their POIs simultaneously.” (MCO 1553.2B, 2011, pp. 2 - 5)

Academic Course Hours-per-Student: EWTGLANT TACP Course schedules were examined to identify how much instruction was provided in the current course. A student “seat” within a group was chosen and all academic instruction time for the student was tabulated. This process was repeated for simulation. The simulation time was further examined by identifying the number of simulators available for an event, the number of instructors identified on the schedule, and the number of students assigned to the student’s group. For each block of simulation training the following formula was applied:

$$[(\text{Time Scheduled}) \div (\text{Number of Students})] \times (\text{Number Instructor \& Equipment Pairs}) =$$

Simulation Conducted Under Direct JTAC (Instructor) Supervision

For venues such as DVTE laptop-simulator and “outside” training some “simulator” time is spent debriefing the event. This resulted in slightly inflated “Total Simulator Time”. The data among all classes are consistent due to standard application of methodology. MSAT dome-simulator utilization times reflect student time “at the console” supervised by a JTAC (Instructor.) The MSAT time “at the console” is more accurate based on the manner in which MSAT training was observed to be conducted. MSAT debriefs are conducted in an adjacent classroom due to the requirement to expedite student training. There is minimal “debrief overhead” associated with the data. See the areas highlighted in red in Table B - 1 for the results of academic hours-per-student, simulator hours-per-student, MSAT hours-per-student, and standard deviations.

Table B - 1. Comparison of Academic Data (Current Execution)

TACP 5-05 through 5-07 (Pre-4 week Course)					
average academic hours	57.56	average simulator hours / student	2.20	"live fire" training hours	4.5
standard deviation	3.08	standard deviation	0.61		
		average MSAT hours / student	1.03		
sum avg academics + sim	59.75	standard deviation	0.41	average academic phase hrs + live fire tng hrs	64.25
academic phase length - hrs	80			Total length - hours	120
academic phase length - days	10			Total length - days	15
Academic effective training days	7.47	% Academic Phase in training	74.69%	% Total TACP course student in training	53.54%
Total effective tng days / student	8.03	% Academic Phase waiting-to-train	25.31%	% Total TACP course waiting-to-train	46.46%
TACP 1-08 through 2-13 (4 week Course)					
average academic hours	84.21	average simulator hours / student	7.86	"live fire" training hours	4.5
standard deviation	7.85	standard deviation	0.95		
		average MSAT hours / student	1.87		
sum avg academics + sim	92.07	standard deviation	0.40	average academic phase hrs + live fire tng hrs	96.57
academic phase length - hrs	120			Total length - hours	160
academic phase length - days	15			Total length - days	20
Academic effective training days	11.51	% Academic Phase in training	76.73%	% Total TACP course student in training	60.36%
Total effective tng days / student	12.07	% Academic Phase waiting-to-train	23.27%	% Total TACP course waiting-to-train	39.64%
TACP 1-12 through 2-13 (~Stabilization of Current Curriculum)					
average academic hours	81.53	average simulator hours / student	8.30	"live fire" training hours	4.5
standard deviation	1.38	standard deviation	0.27		
		average MSAT hours / student	1.69		
sum avg academics + sim	89.83	standard deviation	N/A	average academic phase hrs + live fire tng hrs	94.33
academic phase length - hrs	120			Total length - hours	160
academic phase length - days	15			Total length - days	20
Academic effective training days	11.23	% Academic Phase in training	74.86%	% Total TACP course student in training	58.96%
Total effective tng days / student	11.79	% Academic Phase waiting-to-train	25.14%	% Total TACP course waiting-to-train	41.04%
TACP 2-13					
average academic hours	83.25	average simulator hours / student	8.38	"live fire" training hours	4.5
		average MSAT hours / student	1.75		
sum avg academics + sim	91.63			average academic phase hrs + live fire tng hrs	96.13
academic phase length - hrs	120			Total length - hours	160
academic phase length - days	15			Total length - days	20
Academic effective training days	11.45	% Academic Phase in training	76.36%	% Total TACP course student in training	60.08%
Total effective tng days / student	12.02	% Academic Phase waiting-to-train	23.64%	% Total TACP course waiting-to-train	39.92%

Effective Training Days-Per-Student: “Available academic training time” in hours was determined using a metric of an 8-hour training day (9 hours – 1 hour lunch).

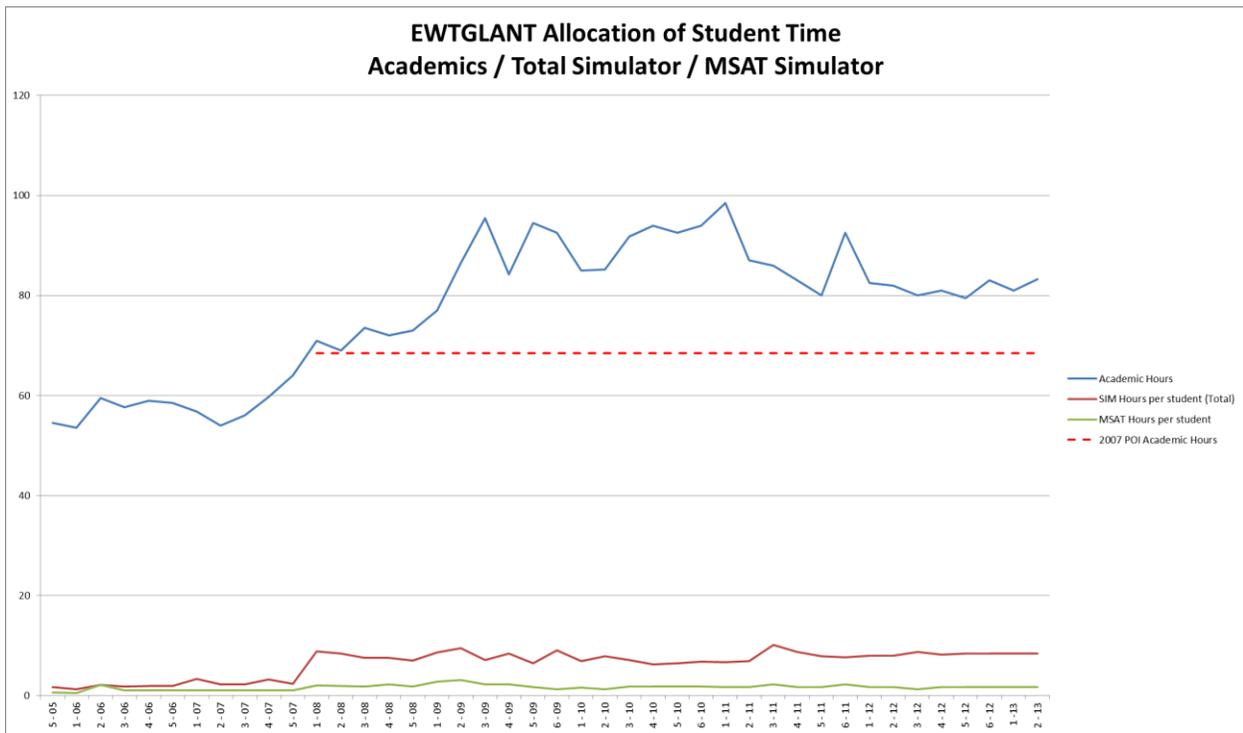
- The 8-hour training day was multiplied by the length-of-the-course in days to determine how many hours of time were available within the course to train a student (8-hours x 15-days = 120 hours).
- The previously calculated academic and simulation hours-per-student were added and the sum was divided by 8 hours to determine the total “effective-training-days” received during the 3-weeks (15 days) of academic and simulation instruction received by a student while at JEB Little Creek, VA.
- By adding the 4.5 hours of instruction (30 minute brief, 30 minute execution, 30 minute debrief per event x 3 events) received during the “live-fire” instruction period at Camp

Lejuene, NC the total amount of time a student received instruction during the 4-weeks (20 days) of the EWTGLANT TACP Course was calculated.

- Results are highlighted in blue on Table B - 1.

A chart depicting academic hours, total simulator hours-per-student, and MSAT hours-per-student for TACP 05-05 through TACP 2-13 is provided with a reference line indicating the academic hours specified by the 2007 EWTGPAC POI in Chart B - 1 below.

Chart B - 1. Allocation of Student Time.



The course is primarily academic and lecture based.

- A student receives instruction during an average of 76.73% of the 120 training hours (3 weeks) available during the academic phase at JEB, Little Creek VA
- A student receives instruction during an average of 60.36% of the 160 training hours (4 weeks) available during the EWTGLANT TACP Course
- Of the 76.73% of training hours at JEB, Little Creek VA, an average of 9.3% is performance based simulation training exposing the student FAC / JTAC to the skills required within the billet

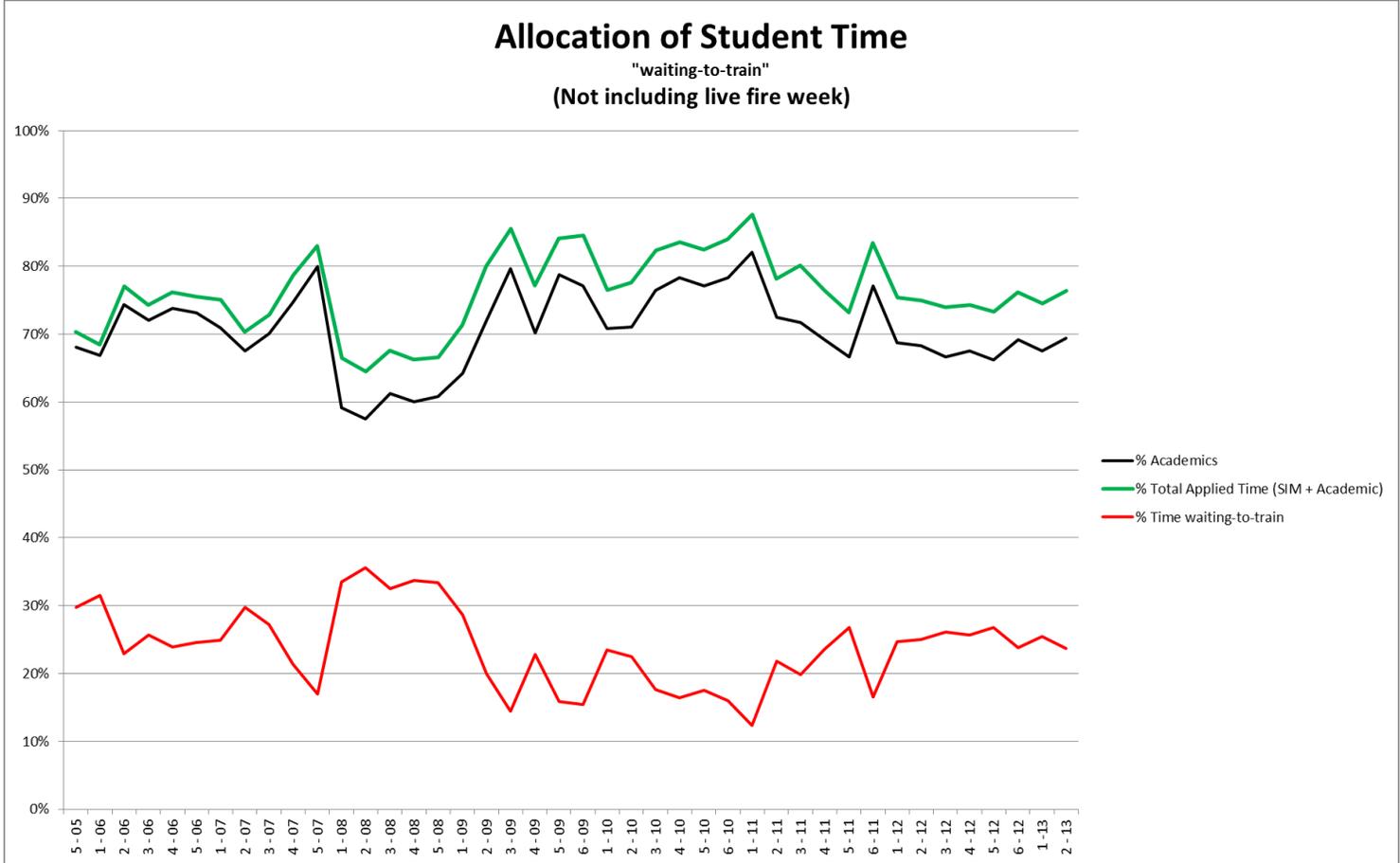
The percentages are constant relatively constant throughout the history of the course. They are driven by a combination of factors to include: course structure, instructor staffing, appropriate instructor experience and background, and production requirement of the current course.

Allocation of Student Time: Academic hours and simulator hours-per-student were divided by the total hours of training time available to determine percentages of time allocated to each activity and calculate what we labeled “student waiting-to-train time” expressed as a percentage of total academic time (15 days / 120 hours.) This label was chosen based on observed comments on student End-of-Course critiques.

- A student spends an average of 23.27% of the 120 training hours (3 weeks) available during the academic phase at JEB, Little Creek VA “waiting-to-train.”
- A student spends an average of 39.64% of the 160 training hours (4 weeks) available during the EWTGLANT TACP Course “waiting-to-train.”

See Chart B – 2. The black line references the percentage of time allocated to academics. The green line references the percentage of individual student time allocated to simulation added to the academic time. The green line also represents “total student training time.” The space between the black line and green line is the portion of total student training time spent conducting performance tasks under supervision of a JTAC(I). The red line is a percentage of total available training time “waiting-to-train”:

Chart B - 2. Allocation of Student time by Percentage.



The percentages are relatively steady over time and a FAC / JTAC student spends a significant amount of time “waiting-to-train.” A significant portion of student time at EWTGLANT is unstructured time. “Time-in-a-seat” does not equate to appropriate training venue, course material, course format, quality instruction or effective adult learning. However, it is difficult to assess content of the course for absent a POI and CDD. The EWTGPAC POI was constructed for 18 students and 10 instructors. The current course is run with 8 instructors and 24 students. The scope of this project did not include a comparison of what classes were added, dropped, or changed to account for the standard deviation of academic instruction hours or what specific skills / tasks were being instructed in the simulators to account for the standard deviation of simulator time. This is recommended for further study via formal ISD / SAT Front-End Analysis with active “customer” participation to clearly define the end-state “readiness requirement” before any irreversible resource decisions are made.

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## APPENDIX C

**Specified Resource – Aviation Support:** Live aviation support is the most significant cost to the EWTGLANT TACP course. Absent a POI and CDD integrated data tracked by EWTGLANT during the “live-fire” portions of their current curriculum and End-of-Course Execution Summaries from FY 11 and 12 were used to determine what resources would have been specified had a POI and CDD existed. The EWTGLANT integrated data was robust and included<sup>33</sup>:

- Number / Type of aircraft requested (Fixed Wing or Rotary Wing).
- Number / Type of aircraft sourced via FRAG process.
- Number / Type of aircraft actually supported.
- VUL time [30 min Time-on-Station (TOS)] requested.
- Actual TOS (time-on-station / time-off-station) supported.
- Percentage of FRAG TOS supported within FRAG window.
- Standard Conventional Load (SCL) (i.e. - ordnance) requested.
- Actual ordnance supported.
- Ordnance released / or delivered “dry” ISO training.<sup>34</sup>

The EWTGLANT “live-fire” summaries documented the amount of time individual aircraft supported Close Air Support training at the range. Estimations were required to account for aircraft transit time from home station – CAS Range – home station. All flight transit times were calculated to and from G-10 range. During FY11 and FY12 the majority of EWTGLANT TACP live-fire training was conducted at Camp Lejeune, NC, G-10 range. Some of the training

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<sup>33</sup> Current EWTGLANT live-fire execution is conducted with the aviation sorties specified in the proposed POI and are identified in the CDD. The execution data from FY 11 and FY 12 are sound estimates of the resources specified in the CDD of the proposed POI.

<sup>34</sup> The tracking of actual ordnance employed, the type of ordnance being “simulated” by the light inert ordnance employed, and the type of ordnance “employed dry” allows cost estimates for “what it might have cost” had a Close Air Support Range compatible for the pieces of ordnance simulated been utilized.

during the period was conducted at BT-11 range. The close proximity of these two ranges is irrelevant for FW aircraft. Additionally, all future EWTGLANT TACP training is planned for G-10. Transit times for each T/M/S were calculated with Joint Mission Planning System (JMPS). The following are the total transit times (to and from G-10) for each aircraft type:

<b>T/M and transit route</b>	<b>Transit time (hh:mm)</b>
FA-18: NBC-G10-NBC	1:00
AV-8 / Alpha: NKT-G10-NKT	0:20
H-1: NCA-G10-NCA	0:16
H-1: NKT-G10-NKT	0:40
FA-18: NTU-G10-NTU	0:50

NBC – MCAS Beaufort, SC / NKT – MCAS Cherry Point, NC / NCA – MCAS New River, NC /  
 NTU – NAS Oceana, VA

Additional considerations for flight hour calculations:

- In-flight refueling was scheduled and executed on some of the FW sorties. In-flight refueling was provided only to Marine Corps participants in the training (FA-18s and AV-8s.) Due to lack of consistent data collected during the live fire summaries throughout FY11 and FY12 regarding individual flight tanking activity, all calculations were made for each sortie transiting to and from their operating airfield before and after their on-station time in support of the TACP class.

FY13 cost-per flight-hour of each Type/Model/Series (T/M/S) aircraft was applied to the FY 11 and FY 12 TACP aircraft support hours and transit times to generate cost-per-student.<sup>35</sup> See Table C – 1.

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<sup>35</sup> We define “sortie” as a single aircraft performing one flight in support of a TACP class.

Table C - 1.

Org/T/M/S	Cost/ft hr
USMC FA-18A+/C	\$9,229.24
USMC FA-18D	\$10,629.71
USMC AV-8	\$10,533.95
USMC H-1*	\$4,116.00
US Air Alpha Jet**	\$250,000.00
USN FA-18A+/C	\$9,321.30
USN FA-18E/F	\$9,189.60

\* Average of UH-1N, UH-1Y and AH-1W cost/ft hr

\*\* Firm-fixed price contract per live fire week (per TACP class)

**FY11 TACP Class Aviation Support Totals:**

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
1-11	USMC FA-18C	NBC	29	18:08	5:00	47:08:00	47.1	\$434,697.20
1-11	USMC FA-18D	NBC	6	2:25	6:00	8:25:00	8.4	\$89,289.56
1-11	USMC AV-8	NKT	14	7:35	4:40	12:15:00	12.4	\$130,620.98
1-11	USMC H-1	NCA	10	15:13	2:40	17:53:00	17.9	\$73,676.40
1-11	USMC H-1	NKT	8	10:30	5:20	15:50:00	15.8	\$65,032.80
1-11	US AIR Alpha Jet	NKT	18	17:10	6:00	23:10:00	23.1	\$250,000.00
1-11	USN FA-18C	NTU	8	5:10	6:40	11:50:00	11.8	\$109,991.34
1-11	USN FA-18E/F	NTU	16	9:10	13:20	22:30:00	22.5	\$206,766.00
<b>Totals:</b>			<b>109</b>	<b>85:21:00</b>	<b>73:40:00</b>	<b>159:01:00</b>	<b>159.0</b>	<b>\$1,360,074.29</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
2-11	USMC FA-18C	NBC	17	9:17	17:00	26:17:00	26.3	\$242,729.01
2-11	USMC FA-18D	NBC	0	0:00	0:00	0:00:00	0.0	\$-
2-11	USMC AV-8	NKT	34	21:28	11:20	32:48:00	32.8	\$345,513.56
2-11	USMC H-1	NCA	24	15:57	6:24	22:21:00	22.4	\$92,198.40
2-11	USMC H-1	NKT	20	11:08	13:20	24:28:00	24.5	\$100,842.00
2-11	US AIR Alpha Jet	NKT	32	19:08	10:40	29:48:00	29.8	\$250,000.00
2-11	USN FA-18C	NTU	20	11:14	16:40	27:54:00	27.8	\$259,132.14
2-11	USN FA-18E/F	NTU	24	15:06	20:00	35:06:00	35.1	\$322,554.96
<b>Totals:</b>			<b>171</b>	<b>103:18:00</b>	<b>95:24:00</b>	<b>198:42:00</b>	<b>198.7</b>	<b>\$1,612,970.07</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total fit time	Total (Hrs)	Total cost
3-11	USMC FA-18C	NBC	28	19:20	4:00	47:20:00	47.4	\$437,465.98
3-11	USMC FA-18D	NBC	11	6:40	11:00	17:40:00	17.6	\$187,082.90
3-11	USMC AV-8	NKT	21	12:30	7:00	19:30:00	19.5	\$205,412.03
3-11	USMC H-1	NCA	32	17:02	8:32	25:34:00	25.6	\$105,369.60
3-11	USMC H-1	NKT	24	14:22	16:00	30:22:00	30.4	\$125,126.40
3-11	US AIR Alpha Jet	NKT	32	18:08	10:40	28:48:00	28.8	\$250,000.00
3-11	USN FA-18C	NTU	20	13:12	16:40	29:52:00	29.8	\$277,774.74
3-11	USN FA-18E/F	NTU	20	12:38	16:40	29:18:00	29.3	\$269,255.28
<b>Totals:</b>			<b>188</b>	<b>113:52:00</b>	<b>114:32:00</b>	<b>228:24:00</b>	<b>228.4</b>	<b>\$1,857,486.92</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total fit time	Total (Hrs)	Total cost
4-11	USMC FA-18C	NBC	38	6:49	14:00	68:49:00	68.8	\$634,971.71
4-11	USMC FA-18D	NBC	10	5:00	10:00	15:00:00	15.0	\$159,445.65
4-11	USMC AV-8	NKT	19	9:54	6:20	16:14:00	16.3	\$171,703.39
4-11	USMC H-1	NCA	12	14:32	3:12	17:44:00	17.8	\$73,264.80
4-11	USMC H-1	NKT	8	10:01	5:20	15:21:00	15.3	\$62,974.80
4-11	US AIR Alpha Jet	NKT	4	4:10	1:20	5:30:00	5.5	\$250,000.00
4-11	USN FA-18C	NTU	15	12:08	12:30	24:38:00	24.6	\$229,303.98
4-11	USN FA-18E/F	NTU	19	18:30	15:50	34:20:00	34.3	\$315,203.28
<b>Totals:</b>			<b>125</b>	<b>105:04:00</b>	<b>92:32:00</b>	<b>197:36:00</b>	<b>197.6</b>	<b>\$1,896,867.61</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total fit time	Total (Hrs)	Total cost
5-11	USMC FA-18C	NBC	6	4:02	6:00	10:02:00	10.1	\$93,215.32
5-11	USMC FA-18D	NBC	0	0:00	0:00	0:00:00	0.0	\$-
5-11	USMC AV-8	NKT	38	22:24	12:40	35:04:00	35.1	\$369,741.65
5-11	USMC H-1	NCA	19	20:48	5:04	25:52:00	25.8	\$106,192.80
5-11	USMC H-1	NKT	19	19:20	12:40	32:00:00	32.0	\$131,712.00
5-11	US AIR Alpha Jet	NKT	20	18:28	6:40	25:08:00	25.1	\$250,000.00
5-11	USN FA-18C	NTU	16	11:02	13:20	24:22:00	24.4	\$227,439.72
5-11	USN FA-18E/F	NTU	13	9:15	10:50	20:05:00	20.1	\$184,710.96
<b>Totals:</b>			<b>131</b>	<b>105:19:00</b>	<b>67:14:00</b>	<b>172:33:00</b>	<b>172.6</b>	<b>\$1,363,012.45</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
6-11	USMC FA-18C	NBC	11	5:06	11:00	16:06:00	16.1	\$148,590.76
6-11	USMC FA-18D	NBC	19	13:58	19:00	32:58:00	32.9	\$349,717.46
6-11	USMC AV-8	NKT	17	9:31	5:40	15:11:00	15.2	\$160,116.04
6-11	USMC H-1	NCA	14	16:14	3:44	19:58:00	19.9	\$81,908.40
6-11	USMC H-1	NKT	11	9:40	7:20	17:00:00	17.0	\$69,972.00
6-11	US AIR Alpha Jet	NKT	12	13:12	4:00	17:12:00	17.2	\$250,000.00
6-11	USN FA-18C	NTU	0	0:00	0:00	0:00:00	0.0	\$-
6-11	USN FA-18E/F	NTU	30	19:21	1:00	44:21:00	44.4	\$408,018.24
<b>Totals:</b>			<b>114</b>	<b>87:02:00</b>	<b>75:44:00</b>	<b>162:46:00</b>	<b>162.7</b>	<b>\$1,468,322.90</b>

<b>FY 11 Aviation Cost per completed student</b>	
Number of JTAC students completed in FY11:	118 (Note 1)
Total cost for FW+RW live support in FY11:	\$9,558,734.24
Cost per JTAC student in FY11:	<b>\$81,006.22 (Note 2)</b>

Note 1 – This is the number of students who completed their initial training within the 6 “Live-Fire” periods of the EWTGLANT TACP Courses. The number includes students that commenced training in one EWTGLANT class and finished in a following EWTGLANT class. It does not include students who commenced training at EWTGLANT and finished at a different training venue.

Note 2 - Aviation resources were applied to students who attended and non-graduated. The cost per JTAC represents the total value of actual aviation resources expended against all EWTGLANT students regardless of pass / fail divided by the number of FACs / JTACs who graduated from EWTGLANT and received their initial certification using resources in the 6 x 1 week windows of opportunity of the Fiscal Year.

### **FY12 TACP Class Aviation Support Totals:**

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
1-12	USMC FA-18C	NBC	50	6:22	2:00	80:22:00	80.4	\$742,030.90
1-12	USMC FA-18D	NBC	22	13:30	22:00	35:30:00	35.5	\$377,354.71
1-12	USMC AV-8	NKT	7	4:34	2:20	6:54:00	6.9	\$72,684.26
1-12	USMC H-1	NCA	46	23:28	12:16	35:44:00	35.7	\$146,941.20
1-12	USMC H-1	NKT	20	10:08	13:20	23:28:00	23.4	\$96,314.40
1-12	US AIR Alpha Jet	NKT	24	13:10	8:00	21:10:00	21.1	\$250,000.00
1-12	USN FA-18C	NTU	2	1:14	1:40	2:54:00	2.9	\$27,031.77
1-12	USN FA-18E/F	NTU	19	10:55	15:50	26:45:00	26.8	\$246,281.28
<b>Totals:</b>			<b>190</b>	<b>107:21:00</b>	<b>125:26:00</b>	<b>232:47:00</b>	<b>232.7</b>	<b>\$1,958,638.51</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
2-12	USMC FA-18C	NBC	22	13:46	22:00	35:46:00	35.7	\$329,483.87
2-12	USMC FA-18D	NBC	23	14:47	23:00	37:47:00	37.8	\$401,803.04
2-12	USMC AV-8	NKT	14	9:05	4:40	13:45:00	13.7	\$144,315.12
2-12	USMC H-1	NCA	35	20:34	9:20	29:54:00	29.9	\$123,068.40
2-12	USMC H-1	NKT	26	12:32	17:20	29:52:00	29.9	\$123,068.40
2-12	US AIR Alpha Jet	NKT	32	18:36	10:40	29:16:00	29.3	\$250,000.00
2-12	USN FA-18A+/C	NTU	19	12:50	15:50	28:40:00	28.7	\$267,521.31
2-12	USN FA-18E/F	NTU	22	15:36	18:20	33:56:00	33.9	\$311,527.44
<b>Totals:</b>			<b>193</b>	<b>117:46:00</b>	<b>121:10:00</b>	<b>238:56:00</b>	<b>238.9</b>	<b>\$1,950,787.57</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
3-12	USMC FA-18C	NBC	24	15:09	0:00	39:09:00	39.1	\$360,863.28
3-12	USMC FA-18D	NBC	10	6:36	10:00	16:36:00	16.6	\$176,453.19
3-12	USMC AV-8	NKT	8	4:36	2:40	7:16:00	7.3	\$76,897.84
3-12	USMC H-1	NCA	29	14:57	7:44	22:41:00	22.7	\$93,433.20
3-12	USMC H-1	NKT	29	14:38	19:20	33:58:00	33.9	\$139,532.40
3-12	US AIR Alpha Jet	NKT	32	18:18	10:40	28:58:00	28.9	\$250,000.00
3-12	USN FA-18A+/C	NTU	23	15:40	19:10	34:50:00	34.8	\$324,381.24
3-12	USN FA-18E/F	NTU	21	13:11	17:30	30:41:00	30.8	\$283,039.68
<b>Totals:</b>			<b>176</b>	<b>103:05:00</b>	<b>111:04:00</b>	<b>214:09:00</b>	<b>214.1</b>	<b>\$1,704,600.83</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
4-12	USMC FA-18A+/C	NBC	10	4:42	10:00	14:42:00	14.7	\$135,669.83
4-12	USMC FA-18D	NBC	8	3:50	8:00	11:50:00	11.8	\$125,430.58
4-12	USMC AV-8	NKT	11	5:27	3:40	9:07:00	9.1	\$95,858.95
4-12	USMC H-1	NCA	24	11:02	6:24	17:26:00	17.4	\$71,618.40
4-12	USMC H-1	NKT	25	11:45	16:40	28:25:00	28.4	\$116,894.40
4-12	US AIR Alpha Jet	NKT	38	20:06	12:40	32:46:00	32.8	\$250,000.00
4-12	USN FA-18C	NTU	0	0:00	0:00	0:00:00	0.0	\$-
4-12	USN FA-18E/F	NTU	13	6:44	10:50	17:34:00	17.6	\$161,736.96
<b>Totals:</b>			<b>129</b>	<b>63:36:00</b>	<b>68:14:00</b>	<b>131:50:00</b>	<b>131.8</b>	<b>\$957,209.11</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
5-12	USMC FA-18A+	NBC	12	5:24	12:00	17:24:00	17.4	\$160,588.78
5-12	USMC FA-18D	NBC	0	0:00	0:00	0:00:00	0.0	\$-
5-12	USMC AV-8	NKT	30	20:12	10:00	30:12:00	30.2	\$318,125.29
5-12	USMC H-1	NCA	14	7:05	3:44	10:49:00	10.8	\$44,452.80
5-12	USMC H-1	NKT	40	18:38	2:40	45:18:00	45.3	\$186,454.80
5-12	US AIR Alpha Jet	NKT	34	20:34	11:20	31:54:00	31.8	\$250,000.00
5-12	USN FA-18A+/C	NTU	17	9:06	14:10	23:16:00	23.3	\$217,186.29
5-12	USN FA-18E/F	NTU	18	9:02	15:00	24:02:00	24.1	\$221,469.36
<b>Totals:</b>			<b>165</b>	<b>90:01:00</b>	<b>92:54:00</b>	<b>182:55:00</b>	<b>182.9</b>	<b>\$1,398,277.32</b>

TACP Class	Org/T/M/S	Base	Actual sortie	Actual TOS (hh:mm)	Transit time	Total flt time	Total (Hrs)	Total cost
6-12	USMC FA-18A+/C	NBC	10	5:26	10:00	15:26:00	15.4	\$142,130.30
6-12	USMC FA-18D	NBC	14	7:55	14:00	21:55:00	21.9	\$232,790.65
6-12	USMC AV-8	NKT	16	9:30	5:20	14:50:00	14.8	\$155,902.46
6-12	USMC H-1	NCA	35	17:01	9:20	26:21:00	26.4	\$108,662.40
6-12	USMC H-1	NKT	10	7:28	6:40	14:08:00	14.1	\$58,035.60
6-12	US AIR Alpha Jet	NKT	40	18:56	13:20	32:16:00	32.3	\$250,000.00
6-12	USN FA-18C	NTU	4	2:23	3:20	5:43:00	5.7	\$53,131.41
6-12	USN FA-18E/F	NTU	27	17:05	22:30	39:35:00	39.6	\$363,908.16
<b>Totals:</b>			<b>156</b>	<b>85:44:00</b>	<b>84:30:00</b>	<b>170:14:00</b>	<b>170.2</b>	<b>\$1,364,560.98</b>

<b>FY 12 Aviation Cost per completed student</b>	
Number of JTAC students completed in FY12:	123(Note 1)
Total cost for FW+RW live support in FY12:	\$9,334,074.30
Cost per JTAC student in FY12:	<b>\$75,886.78 (Note 2)</b>

Note 1 – This is the number of students who completed their initial training within the 6 “Live-Fire” periods of the EWTGLANT TACP Courses. The number includes students that commenced training in one EWTGLANT class and finished in a following EWTGLANT class. It does not include students who commenced training at EWTGLANT and finished at a different training venue.

Note 2 - Aviation resources were applied to students who attended and non-graduated. The cost per JTAC represents the total value of actual aviation resources expended against all EWTGLANT students regardless of pass / fail divided by the number of FACs / JTACs who graduated from EWTGLANT and received their initial certification using resources in the 6 x 1 week windows of opportunity of the Fiscal Year.

**Estimated Proposed POI Aviation Support Total Cost:**

The proposed POI “live-fire” is executed with the same aviation resources currently used. FY13 cost-per flight-hour was applied to the current “live-fire” support request (see Appendix I) to generate a proposed POI cost per FAC / JTAC student. See Table C - 2:

Table C - 2.

	Type (Org)	Base	Frag sorties	Frag TOS (Hrs)	Transit Time (Hrs)	Total (Hrs)	Total Cost
Note 1	FW (USN)	NTU	48	24.0	38.4	62.4	\$577,540.08
Note 2	FW (CCAS)	NKT	48	24.0	14.4	38.4	\$250,000.00
Note 3	FW (USMC)	NBC	16	8.0	16.0	24.0	\$238,307.40
Note 4	FW (USMC)	NKT	16	8.0	4.8	12.8	\$134,834.56
Note 5	RW (USMC)	NCA	48	24.0	9.6	33.6	\$138,297.60
	RW (USMC)	NKT	16	8.0	9.6	17.6	\$72,441.60
	<b>Totals:</b>		<b>192</b>	<b>96.0</b>	<b>92.8</b>	<b>188.8</b>	<b>\$1,411,421.24</b>

Note 1: Avg cost/flt hr for USN FA-18A+/C/E/F is \$9,255.45

Note 2: Firm-fixed price for CCAS of \$250,000

Note 3: 50% of USMC FW avg cost/flt hr FA-18A+/C/D of \$9,929.48

Note 4: 50% of USMC FW AV-8s from NKT at \$10,533.95 per flt/hr

Note 5: 75% of USMC RW from NCA and 25% from NKT at \$4,116.00 per flt/hr

<b>Proposed POI Estimated Cost per student</b>	
Number of JTAC students:	144 (Note 1)
Total estimated cost for FW+RW support:	\$8,468,527.44 (Note 2)
Estimated Cost per JTAC student:	<b>\$58,809.22</b>

Note 1: FY13 estimates are predicated on the assumption all 24 student quotas per class are filled, all graduate, the same number of FW and RW sorties continue to be requested IAW the current EWTGLANT live fire template, and apportionment remains the same between USMC, USN and US Air Contract CAS as planned.

Note 2: Total estimated proposed POI cost is predicated on all 192 FRAGGED sorties executing exactly the assigned 30 minutes Time-On-Station. The same transit times applied to FY 11 and FY 12 data were applied to the proposed POI forecast.

Analysis: Live Contract CAS aircraft are paid with a Firm-Fixed cost of \$250,000.00. Live military aviation resources are planned and requested for 24 students per class in a process that requests the aviation support approximately two months prior to a class being convened. This defines all military aviation resources other as variable costs that can “be turned off”. However, because:

- Aviation sorties are requested ~2 months prior to “live-fire” training
- The number of students “non-graduated” prior to live-fire is not know
- Sorties are not cancelled based on class size of academic non-graduation prior to the “live-fire” week in order to ensure sufficient available sorties during the “live-fire” week

Navy and Marine Corps aviation sorties are considered a “set” variable cost by the organizational structure of the curriculum.

Unfilled seats and non-graduated students result in a smaller group to share the total value of resources. Another factor increasing costs is an average 5.8 minute-per-sortie extension of time-on-station (TOS) for all sorties flown during FY11 and FY12. Despite the lower overall number of sorties documented to have supported EWTGLANT in FY 11 and 12, the average cost per- FAC / JTAC exceeds the forecast average cost per FAC / JTAC of the proposed POI due to costs exceeding the forecast proposed POI support requirement.

The EWTGLANT data allows analysis of Time-on-Station and transit times constructed to support determination of support Overhead. Range proximity to aircraft home station decreases transit time and aviation resource support overhead for TACP Course support. For FY 11 and FY 12 data and calculations are provided in Table C - 3 and Table C - 4. Data were determined using the following formula:

$$\frac{(\text{Total FY Cost of Aviation Support} - \text{Fixed Cost of CCAS}) * \text{Percentages of TOS or Transit time}}{\text{Cost of TOS or Transit time}}$$

Further calculations exceeded the scope of the project.

The Contract CAS support is successful due to the hard work of the Marine Aviaiton Logistics squadron ordnance-men who support the CCAS aircraft during the TACP live-fires. Interviewees universally expressed their appreciation for their hard work and recognized the importance of this support ot the success of the program.

Table C - 3. FY 11 Military A/C TOS versus Transit Time (i.e. - Overhead)

Class	Sorties	TOS	Transit Time (O/H)
1-11	91	68.1	67.6
2-11	139	84.1	84.7
3-11	156	95.7	103.8
4-11	121	100.9	91.2
5-11	111	86.8	60.5
6-11	102	73.8	71.7
<b>FY Total</b>	<b>720</b>	<b>509.4</b>	<b>479.5</b>

- Total Military A/C Flight Time in FY 11:  $(509.4 + 479.5) = 988.9$
- Total cost for Military aircraft flight hours in FY11: \$8,058,734.24
- Percentage of flight hours provided Time on Station to EWTGLANT FY 11: 52%
- Percentage of Transit time flight hours FY 11: 48%
- Cost of FY 11 Military aircraft TOS provided to EWTGLANT: \$4,151,197.51
- Cost of FY 11 Military aircraft Transit to support EWTGLANT: \$3,907,536.72
- Fixed-Cost of Contract Close Air Support (CCAS) FY 11: \$1,500,000
- CCAS Sorties flown ISO EWTGLANT during FY 11: 118
- Cost of FY 11 Aviation Support to EWTGLANT (Military TOS cost + CCAS cost): \$5,651,197.51
- Cost of O/H required to provide support to EWTGLANT (Transit Time) FY 11: \$3,907,536.72
- Military Sorties per student: 7.32 Sorties per student for 118 graduated students
- CCAS Sorties per Student: 1.00 per student for 118 graduated students
- **FY 11 aviation sorties per graduated student: 8.32**

Table C -4. FY 12 Military A/C TOS versus Transit Time (i.e. - Overhead)

Class	Sorties	TOS	Tansit Time (O/H)
1-12	166	94.1	117.4
2-12	161	99.1	110.5
3-12	144	84.7	100.4
4-12	91	43.5	55.5
5-12	131	69.4	81.5
6-12	116	66.8	71.1
<b>FY Total</b>	<b>809</b>	<b>457.6</b>	<b>536.4</b>

- Total Military A/C Flight Time in FY 12:  $(457.6 + 536.4) = 994$
- Total cost for Military aircraft flight hours in FY12: \$7,834,074.30
- Percentage of flight hours provided Time on Station to EWTGLANT FY 12: 46%
- Percentage of Transit time flight hours FY 12: 54%
- Cost of FY 12 Military aircraft TOS provided to EWTGLANT: \$3,606,511.47
- Cost of FY 12 Military aircraft Transit to support EWTGLANT: \$4,227,562.83
- Fixed-Cost of Contract Close Air Support FY 12: \$1,500,000
- CCAS Sorties flown ISO EWTGLANT during FY 12: 200
- Cost of FY 12 Aviation Support to EWTGLANT (Military TOS cost + CCAS cost): \$5,106,511.47
- Cost of O/H required to provide support to EWTGLANT (Transit Time) FY 12: \$4,227,562.83
- Military Sorties per student: 7.02 Sorties per student for 123 graduated students
- CCAS Sorties per Student: 1.63 per student for 123 graduated students
- **FY 12 aviation sorties per graduated student: 8.63**

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## APPENDIX D

Non-Combat Expenditure Allowance: OPNAV N-88 allocates NCEA to MARFORCOM for aviator training. No aviation ordnance is allocated to the Marine Corps for FAC / JTAC training. MARFORCOM provides NCEA to 2D MAW and a small amount of ordnance to EWTGLANT. Tracking NCEA expenditure against specific training (squadron, TACP, etc) via the OIS (Ordnance Information System) is not possible. The issues are similar to those identified with TAMIS and ground ammunition. EWTGLANT and MARFORCOM have worked to increase the accuracy of expenditure and have reduced the disparity of OIS entered data by the squadron and EWTGLANT observation and tracking of expenditure on the CAS ranges. This is an issue because an organization must show usage to retain or build an NCEA pool. Additionally, without a FAC / JTAC high explosive Air-Ground ordnance training requirement the cheapest option will be resourced which is light inert.

NCEA is a variable cost that is allowed to vary because of no specification for what ordnance a student is required to control during the TACP Course. From Tables D - 2 and D - 3:

- The FY11 average cost of NCEA per student was \$17,167.34. See Table D – 2.
- The FY 12 average cost of NCEA per student was \$10,510.90. See Table D – 3.
  - FY 12 class-high of \$16,168.47 per student (TACP 2-12).
  - FY 12 class-low of \$5,969.77 per student for (TACP 5-12).
- The proposed POI NCEA light inert option with no LGTR employment due to G-10 range restrictions is forecast to be \$19,819.38.

The variation between classes within FY 12 was due to the EWTGLANT TACP decision to discontinue the use of Laser Guided Training Rounds (LGTRs) in the BT-11 range complex due to range restrictions limiting LGTR employment to profiles incompatible with FAC / JTAC training followed by the same decision at G-10 Range October 2012. EWTGLANT will not employ LGTR at G-10 range complex until range restrictions allow employment from aircraft profiles that are representative of the tactical profiles to be used in combat in order to prevent negative transfer of student learning.

New POI desires and likely NCEA costs: The “live-fire” template of the current curriculum is the same resource template to be applied to the proposed POI. While the proposed POI specifies LGTR, execution of the “live-fire” portion of the course at G-10 will likely result in lower cost per student than forecast due to lack of LGTR expenditure. The proposed POI provides a list of ordnance that should be used to qualify student TACPs. The list includes Fixed-Wing Live High Explosives, Precision Guided Munitions and Inertial Guided Munitions. Utilization of the “Live Option” ordnance of the proposed POI would incur a cost of up to \$63,567.73. See Table D – 1.

The proposed POI was written to request one AGM-114 Hellfire missile to be fired during each class. While the missile costs \$43,128 each, when taking into account that there are 24 people in each class, this can be done for a cost of just \$1,797.14 per student. Neither of these is practicable in the Camp Lejeune, NC area because of range restrictions prohibiting high-explosive ordnance and the small size of the range.

The light-inert option without LGTR allows training to continue and the average cost per student approximately \$19,819.38.

The disparity between actual employment cost and increased proposed cost is due to actual ordnance expenditure for FY 12 was average 8 x 2.75” rockets per student. The proposed POI specifies 13.2 x 2.75” rockets per student. See table D - 3.

Table D - 1. Estimated cost of NCEA.

<b>FIXED WING</b>	<b>Ordnance per student</b>	<b>Cost per student (proposed POI – Live HE)</b>	<b>Cost per student (proposed POI - light inert)</b>
Gun	220	\$1,619.21	\$1,619.21 (Note 2)
MK-76	2.2	\$33.58	\$33.58
MK-82	1.1	\$2,175.21	
LGTR	2.2	\$11,638.00	
GBU-38 INERT	1.1	\$28,138.00	
<b>ROTARY WING</b>	<b>Ordnance per student</b>	<b>Cost per student (proposed POI)</b>	<b>Cost per student (light inert)</b>
Gun	220	\$1,496.50	\$1,496.50 (Note 2)
HELLFIRE	0.0417	\$1,797.14	
2.75" HE ROCKET (MOD 4)	13.2	\$16,670.08	\$16,670.08 (Note 2)
<b>Cost per Student</b>		<b>\$63,567.73</b>	<b>\$19,819.38</b>

Note 1: "Ordnance per student" data extracted from the proposed POI.

Note 2: 2.75" Rocket costs Rotary Wing gun, Fixed Wing gun, and MK-76 are able to be employed on G-10 range.



Table D - 3. FY12 NCEA Costs.

FY-12 NCEA		TACP 1-12		TACP 2-12		TACP 3-12		TACP 4-12		TACP 5-12		TACP 6-12		End-of FY 12		cost per
NALC	NOMENCLATURE	12 EXPENDED		2-12 EXPENDED		3-12 EXPENDED		4-12 EXPENDED		5-12 EXPENDED		6-12 EXPENDED		FY EXPENDED		
A978	CTG, 25MM, PGU-23/U, TP	700	\$ 9,800.00	0	\$ -	0	\$ -	0	\$ -	150	\$ 2,100.00	500	\$ 7,000.00	1350	\$ 18,900.00	\$ 14.00
A891	CTG, 20MM, PGU-27/B, M55A2, TP	1900	\$ 6,460.00	475	\$ 1,615.00	2020	\$ 6,868.00	200	\$ 680.00	0	\$ -	800	\$ 2,720.00	5395	\$ 18,343.00	\$ 3.40
A896	CTG, 20MM, LKD, TP PGU-27/B RW	1500	\$ 8,535.00	4300	\$ 24,467.00	2480	\$ 14,111.20	2600	\$ 14,794.00	3350	\$ 19,061.50	3450	\$ 19,630.50	17680	\$ 100,599.20	\$ 5.69
A131	CTG, 7.62MM, LKD, BALL AND TRACER	2000	\$ 1,700.00	7600	\$ 6,460.00	2200	\$ 1,870.00	2500	\$ 2,125.00	4200	\$ 3,570.00	7850	\$ 6,672.50	26350	\$ 22,397.50	\$ 0.85
A557	CTG, .50 CAL, LKD AND TRACER	1750	\$ 4,742.50	2550	\$ 6,910.50	800	\$ 2,168.00	550	\$ 1,490.50	700	\$ 1,897.00	2650	\$ 7,181.50	9000	\$ 24,390.00	\$ 2.71
H842	WHD, 2.75 INCH HE	127	\$ 4,348.48	114	\$ 3,903.36	147	\$ 5,033.28	97	\$ 3,321.28	0	\$ -	0	\$ -	485	\$ 16,606.40	\$ 34.24
H 663	WHD, 2.75 INCH PRAC	0	\$ -	79	\$ 1,413.31	22	\$ 393.58	0	\$ -	89	\$ 1,592.21	107	\$ 1,914.23	297	\$ 5,313.33	\$ 17.89
HA07	RKT MTR, 2.75 INCH MK66 MOD 4	127	\$ 158,115.00	193	\$ 240,285.00	169	\$ 210,405.00	97	\$ 120,765.00	89	\$ 110,805.00	107	\$ 133,215.00	782	\$ 973,590.00	\$ 1,245.00
MT95	CTG, IMP, CCU-107/B	198	\$ 5,165.82	88	\$ 2,295.92	119	\$ 3,104.71	87	\$ 2,269.83	65	\$ 1,695.85	69	\$ 1,800.21	626	\$ 16,332.34	\$ 26.09
FW92	CCG, MAU-169A/B	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 10,000.00
XW32	ARMING CABLE F/GBU-10/12-16	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 490.00
EB52	GUIDANCE SET, KMU-572A/B, F/MK82 JDAM	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 23,878.00
BWHC	ACCESSORY SET F/FMU-139 FUZE	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 2,000.00
EB05	FUZE, BOMB, FMU-139B/B	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 2,000.00
GW03	SWITCH, ARM, SAFETY, MK122	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 655.00
F470	CTG, SIG, CXU-3	175	\$ 1,750.00	63	\$ 630.00	81	\$ 810.00	68	\$ 680.00	51	\$ 510.00	35	\$ 350.00	473	\$ 4,730.00	\$ 10.00
F562	CTG, SIG, MK4	23	\$ 94.99	25	\$ 103.25	38	\$ 156.94	19	\$ 78.47	14	\$ 57.82	34	\$ 140.42	153	\$ 631.89	\$ 4.13
F289	BOMB, GP, MK82, LD 500LB, NTP/TP	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 1,046.00
F782	FIN ASSY, BOMB, BSU-33	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 427.00
F017	BOMB, PRAC, BDU-45/B, 500LB, NTP	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 1,599.00
PC91	GM, HELLFIRE, AGM-114B	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 43,128.00
PU61	GM, TOW, TACT, BGM-71E-5B	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ 49,241.00
E973	BOMB, PRAC, MK76 W/SUSP LUG	117	\$ 3,573.18	40	\$ 1,221.60	59	\$ 1,801.86	78	\$ 2,382.12	65	\$ 1,985.10	69	\$ 2,107.26	428	\$ 13,071.12	\$ 30.54
EB33	LGTR, BDU-58 A/B	81	\$ 162,000.00	48	\$ 96,000.00	5	\$ 10,000.00	9	\$ 18,000.00	0	\$ -	0	\$ -	143	\$ 286,000.00	\$ 2,000.00
YW33	RKT, SMOKEY SAM	58	\$ 9,926.12	16	\$ 2,738.24	0	\$ -	0	\$ -	0	\$ -	0	\$ -	74	\$ 12,664.36	\$ 171.14
NW20	CHAFF, RR-129/L	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	
LA10	FLARE, SIM, SM-875/ALE	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	
	NCEA cost per class		\$ 376,211.09		\$ 388,043.18		\$ 256,722.57		\$ 166,586.20		\$ 143,274.48		\$ 182,731.62		\$ 1,513,569.14	
	Rockets per class	254		386		338		194		178		214				
	Rockets per student	10.583333		16.08333		14.08333		8.083333		7.4166667		9				
	NCEA cost per student (by class)		\$ 15,675.46		\$ 16,168.47		\$ 10,696.77		\$ 6,941.09		\$ 5,969.77		\$ 7,613.82		\$ 10,510.90	

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## APPENDIX E

**Specified Resource – Ground Ammunition:** Systemic issues regarding accountability of ground ammunition expended in support of EWTGLANT FAC/ JTAC training remain unchanged since identified by CNA in their 2004 report.<sup>36</sup> Interviews with all levels of ground ammunition resource providers identified that the system used by firing units called TAMIS (Total Ammunition Management Information System - TAMIS) to account for ammunition expenditure was unable to account for the training activity for which the ammunition was expended. TAMIS was designed to serve as an accurate “bean counter” for accountability and not designed to serve as a link between resources and training.

Ammunition is not allocated to EWTGLANT. EWTGLANT releases a Ground Support Message for each TACP Course “Live-Fire” and ammunition requirements are identified on the message. The specified amount of ammunition is drawn from a common “TACP” pool maintained by II MEF. All II MEF and 2D MARDIV units are authorized to draw from this pool for any training associated with “TACP.”

Ground ammunition flows through the following custody chain:

- Ammunition for use ISO “TACP” is provided by TECOM to II MEF
  - The “TACP” ammo enters common pools of 81mm and 155mm ammo.
  - The “TACP” quantities are tracked amongst combined on-hand totals.
- II MEF sub-allocates to subordinate units:
  - 155 mm ammunition is managed by 10<sup>th</sup> Marines.
  - 10<sup>th</sup> Marines allocates / tracks 155 mm expenditure among the battalions / batteries of the Regiment.
  - 81 mm mortar ammunition is managed by 2D MARDIV Ammunition Officer
  - 2D MARDIV Ammunition Officer allocates / tracks 81 mm mortar expenditure among the battalions (10+) of the Division.

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<sup>36</sup>The CNA report stated: “While every round is accounted for, and attributed in total as “supporting a TACP shoot,” there is no association at a lower level of aggregation as to what numbers, of what type, were fired in support of which evolution (e.g., how many of the total were fired in support of a given number of suppression missions).” (Lambert, 2004, p. 73)

- The ammunition is signed over to the firing unit (artillery or infantry battalion) who becomes the trusted custodian of the ammunition until expenditure is documented or surplus is returned to the Ammunition Supply Point (ASP).
- Quantities are tracked. Training conducted with the quantities is not.
- II MEF will allocate ammunition (by 81 mm and 155 mm) until expenditure reaches 80% of on-hand amounts
- II MEF requests an increase of on-hand amounts from MARFORCOM when expenditure reaches 80%. If MARFORCOM does not have the amounts and / or they have expended 80% of the MARFORCOM on-hand amounts MARFORCOM looks to the adjacent MARFOR

Resource Cost: See Table E - 1 for calculated costs.

Table E - 1. Cost of Ground Ammunition

<b>Cost of Ground Ammunition</b>			
<b>TACP T &amp; R Manual (126 students / year)</b>	<b>TACP T &amp; R Manual (144 students / year)</b>	<b>FY 12 TECOM ground ammo allotment</b>	<b>Proposed POI (144 Students / year)</b>
<b>\$7,531,134.73</b>	<b>\$8,608,594.16</b>	<b>\$4,424,888.90</b>	<b>\$4,590,890.26</b>
<b>Cost per Student per</b>			
<b>\$52,299.55</b>	<b>\$59,781.90</b>	<b>30,728.40</b>	<b>\$31,881.18</b>

The following documents were referenced to construct the ground ammunition costs:

- POM-14 TMR dated January 2012 for ordnance cost-per-piece prices
- TACP T & R Manual for specified allocation
- TECOM DC CD&I for historical actual allocation
- Proposed POI for projected expenditure

The TACP T & R Manual specifies an ammunition allocation to support a student production of 126 students during 7 classes of 21 students. See Table E - 2. An assumption was injected that increased ammunition allocation would be required to compensate for the increase in class size from 126 to 144. We converted the 126 student round quantity of the current T & R

to an equivalent quantity for 144 students to match the proposed POI course capacity. See Table E - 3. This enabled a common comparison. A comparison between the TECOM FY 12 allocation, the T & R Manual specified quantities adjusted for 144 students, and the proposed POI (144 students) is provided in Table E - 4. Cost differences between the TACP T & R Manual, the T & R Manual adjusted for 144 students, the FY 12 TECOM allotment and the proposed POI for 144 students are also provided below in Table E - 1.

## Ground Ammunition Tables (1 of 2)

### Table E - 2. T & R Ground Ammo for 126 students

Ground Ammunition Comparison (TACP T & R ammunition allocation for 126 students / year [6 classes 21])						
		EWTGLANT FY 13 NCEA (e-mail from TECOM DC CD&I and II MEF G-4 Ammo dtd 12 Sept 2012)	TACP NAVMC 3500.42A TACP T & R 13 May 2011 REQUIREMENTS	DRAFT POI REQUIREMENTS	% NAVMC 3500.42A TACP T & R specified amm required for DRAFT POI	Increase / (Decrease) of ammunition requirements from T & R to POI
NALC	NOMENCLATURE	ALLOCATION	FY REQUIRED [126 students / 6 classes of 21]	FY REQUIRED [144 students / 6 classes of 24]		Delta
C869	Cartridge, 81mm HE M889/M889A1 with PD Fuze M935	2060	0 (Note 2)	950	N/A	950
C870	Cartridge, 81mm Smoke Red Phosphorus M819 MTSQ Fuze	630	0 (Note 2)	475	N/A	475
C871	Cartridge, 81mm Illuminating M853A1 with MTSQ Fuze M772	420	0 (Note 2)	0	N/A	0
C875	Cartridge, 81mm Practice M879	630	0 (Note 2)	0	N/A	0
D505	Projectile, 155mm Illuminating M485A2 and Sub f/D550	350	339	475	140.2%	136
D529	Projectile, 155mm High Explosive M795	1050	5085	2376	46.7%	(2709)
D550	Projectile, 155mm Smoke White Phosphorus M110A1	700	791	158	20.0%	(633)
		<b>Total Rounds (81mm &amp; 155mm) -</b>	<b>6215</b>	<b>4435</b>	<b>NET CHANGE -</b>	<b>(1780)</b>

### Table E - 3. T & R Ground Ammo for 144 students

Ground Ammunition Comparison (TACP T & R ammunition requirement for 144 students / year [6 classes 24])						
		EWTGLANT FY 13 CLASS V ALLOCATION (ORIGINAL Email from Mr Ronnell TECOM DC CD&I and II MEF G-4 Ammo: 12 Sept 2012)	TACP NAVMC 3500.42A TACP T & R 13 May 2011 REQUIREMENTS	DRAFT POI REQUIREMENTS	% NAVMC 3500.42A TACP T & R specified amm required for DRAFT POI	Increase / (Decrease) of ammunition requirements from T & R to POI
NALC	NOMENCLATURE	ALLOCATION	FY REQUIRED [144 students / 6 classes of 24]	FY REQUIRED [144 students / 6 classes of 24]		Delta
C869	Cartridge, 81mm HE M889/M889A1 with PD Fuze M935	2060	0 (Note 2)	950	N/A	950
C870	Cartridge, 81mm Smoke Red Phosphorus M819 MTSQ Fuze	630	0 (Note 2)	475	N/A	475
C871	Cartridge, 81mm Illuminating M853A1 with MTSQ Fuze M772	420	0 (Note 2)	0	N/A	0
C875	Cartridge, 81mm Practice M879	630	0 (Note 2)	0	N/A	0
D505	Projectile, 155mm Illuminating M485A2 and Sub f/D550	350	388	475	122.5%	87
D529	Projectile, 155mm High Explosive M795	1050	5812	2376	40.9%	(3436)
D550	Projectile, 155mm Smoke White Phosphorus M110A1	700	904	158	17.5%	(746)
		<b>Total Rounds (81mm &amp; 155mm) -</b>	<b>7104</b>	<b>4435</b>	<b>NET CHANGE -</b>	<b>(2669)</b>

## Ground Ammunition Tables (2 of 2)

### Table E - 4. Ground Ammo Cost Comparison

Comparison Between TECOM Class V Allocation, T & R TACP Required Quantities (assuming 144 students / year), and New POI Requirements								
		EWTGLANT FY 13 CLASS V ALLOCATION (ORIGINAL Email from Mr Ronnell TECOM DC CD&I and II MEF G-4 Ammo: 12 Sep 12)			TACP NAVMC 3500.42A TACP T & R 13 May 2011 REQUIREMENTS		DRAFT POI REQUIREMENTS	
NALC	NOMENCLATURE	Cost-per-piece	ALLOCATION	Cost-per-piece	FY REQUIRED [144 students / 6 classes of 24]	Cost-per-piece	FY REQUIRED [144 students / 6 classes of 24]	Cost-per-piece
C869	Cartridge, 81mm HE M889/M889A1 with PD Fuze M935	\$ 410.08	2060	\$ 844,764.80	0 ( Note 1)	0 ( Note 1)	950	\$ 389,740.03
C870	Cartridge, 81mm Smoke Red Phosphorus M819 MTSQ Fuze	\$ 878.07	630	\$ 553,184.10	0 ( Note 1)	0 ( Note 1)	475	\$ 417,258.86
C871	Cartridge, 81mm Illuminating M853A1 with MTSQ Fuze M772	\$ 781.30	420	\$ 328,146.00	0 ( Note 1)	0 ( Note 1)	0	\$ -
C875	Cartridge, 81mm Practice M879	\$ 191.40	630	\$ 120,582.00	0 ( Note 1)	0 ( Note 1)	0	\$ -
D505	Projectile, 155mm Illuminating M485A2 and Sub f/D550	\$ 1,328.32	350	\$ 464,912.00	388	\$ 515,388.16	475	\$ 631,217.66
D529	Projectile, 155mm High Explosive M795	\$ 972.30	1050	\$ 1,020,915.00	5812	\$ 5,651,007.60	2376	\$ 2,310,184.80
D550	Projectile, 155mm Smoke White Phosphorus M110A1	\$ 856.00	700	\$ 599,200.00	904	\$ 773,824.00	158	\$ 135,590.40
DA13	Charge, Propellant 155mm MACS M232	\$ 138.67	2100	\$ 291,207.00	7104	\$ 985,111.68	3010	\$ 417,396.70
N532	Primer, Percussion M82	\$ 7.10	2100	\$ 14,910.00	7104	\$ 50,438.40	3010	\$ 21,371.00
N340	Fuze, Point Detonating M739/M739A1	\$ 89.08	2100	\$ 187,068.00	7104	\$ 632,824.32	3010	\$ 268,130.80
<b>Totals</b>				\$ 4,424,888.90		\$ 8,608,594.16		\$ 4,590,890.26

Note 1 - Per the TACP T&R Appenix C, Mortar ammunition can be used as a substitute for artillery ammunition if an artillery firing unit is not available.

- Codifying the mortar ammunition specified in the proposed POI was not a concern of any ground ammunition resource provider.

Ground Ammunition Analysis: The absence of data prohibits a quantifiable comparison predicated on actual consumption rates. The costs presented (see Table E -1) are a comparison between TACP T & R Manual specified requirements and proposed POI specified requirement. Expenditure of the TECOM “TACP” allotment is not tracked when expended ISO EWTGLANT. Actual FY expenditures could be anywhere between TECOM allocated quantities to the quantities required per the TACP T & R Manuals for 144 students.

TACP 1-13 155 mm expenditures reported by the firing-battery were 73.9% of the EWTGLANT Ground Support Request. Current live fire expenditure rates are IAW the live-fire template proposed in the proposed POI. The current expenditure rates are likely representative of the rates of the proposed POI.

- The projected savings based on a reduction from the 126 student T & R specified requirement to the 144 student proposed POI requirement would be 47%.
- The projected savings based on a reduction from the 144 student T & R specified requirement to the 144 student proposed POI requirement would be 40%.

Additionally the following is provided:

- Net decrease in IDF rounds = 1780 rounds
- Reduction of 155 HE rounds = 3436 rounds
- Reduction of 155 WP rounds = 633 rounds
- Increase 155 Illumination rounds = 136 rounds
- Increase 81 mm mortars HE = 950
- Increase 81 mm mortar RP = 475
- Requirement (vice option) for 81 mm
- Quantities removed from 155mm allocation IAW T & R manual page C-2 note 8
- \$2,940,244.47 – value of ground ammunition specified as a T & R Manual (126 students) resource requirement not required by proposed POI (144 students.)
- Net total IDF Ammo reduction of 38%
- Net decrease in IDF rounds = 2669 rounds
- Reduction of 155 HE rounds = 3436

- Reduction of 155 WP rounds = 746
- Increase 155 Illumination rounds = 87
- Increase 81 mm mortars HE increase = 950
- Increase 81 mm mortar RP = 475
- \$4,017,703.90 - value of ground ammunition specified as a T & R Manual (converted to quantities required for 144 students) resource requirement not required by the proposed POI (144 students)

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## APPENDIX F

**TAD Cost:** TAD costs for a class of 20 Marines are provided for the four-week and five-week course. See Table VI – 1.

- Increased cost to TECOM per-Marine for 5-week course: \$893.50.
- Increased cost to TECOM per-course for 5-week course: \$17,870.

Table VI - 1. TAD Costs

	daily	weekly		TAD cost for 1 Marine		Total class TAD cost (20 Marines)	
Lodging	\$ 72.00	\$ 504.00		\$ 4,467.50	5 weeks	\$ 89,350.00	
Per Diem	\$ 46.00	\$ 322.00		\$ 3,574.00	4 weeks	\$ 71,480.00	
Rental car		\$ 67.50					
				\$ 893.50		\$ 17,870.00	difference
	\$ 118.00	\$ 893.50					

**Assumptions:**

- Lodging provided at the Combined Bachelor Quarters (CBQ)
- Local per diem rate
- Rental car (1 vehicle per two Marines)

4 students per-course are Naval Aviators stationed at NAS Oceana, Virginia Beach, VA. They live locally and would not receive TAD funds form TECOM.

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# **Project Proposal & Scope**



Naval Postgraduate School  
Monterey, California

**Cost Benefit Analysis of Initial Joint Terminal Attack  
Controller Certification Training Options**

Presented to:

Colonel James McGrath, USMC  
Director of Operations and Training,  
Expeditionary Warfare Training Group, Atlantic (EWTGLANT)

15 Jan 2013

Oceana 1 Consulting Team

Peter Guerrant  
Richard Stafford  
Steven Djunaedi  
Dr. Frank “Chip” Wood, Senior Consultant

## **Introduction**

This proposal is a summary of details for the project discussed by representatives from the Oceana 1 Consulting Team and Colonel James McGrath USMC, Director of Operations and Training, EWTGLANT. We are confident that the methods outlined in this proposal will provide useful quantitative and qualitative data that will contribute to increased understanding of known differences and identification of as-of-yet unforeseen differences that may impact the decision to implement the proposed Tactical Air Control Party Program of Instruction (POI) or maintenance of the current POI. We thank you for the opportunity to more clearly define important aspects of this pending decision.

## **Background**

EWTGLANT is a naval command that serves as a Marine Corps Formal Learning Center (FLC) with the mission of providing training to the operating forces of the Marine Corps as well as naval units and coalition forces that operate alongside the Marine Corps. Several of the courses offered at EWTGLANT are Marine Corps “unique” with the funding, curriculum review and approval managed by HQMC Training and Education Command (TECOM). TECOM is responsible for establishing the training tasks, conditions, and standards for these courses and publishing them via Marine Corps Training and Readiness (T & R) Manuals. Once T & R Manuals are published or updated, it is the responsibility of the FLC to develop the POI and Course Descriptive Data (CDD) to provide a detailed course description and a summary of required resources. These POI and CDD are required to be approved by HQMC TECOM in an increasingly competitive budgetary environment.

The Tactical Air Control Party (TACP) course is a TECOM course taught at EWTGLANT. Students are sourced from the Marine Corps, Navy, and coalition partners and graduates are certified to conduct Terminal Attack Control IAW the Joint Close Air Support (JCAS) Action Plan (AP) Memorandum of Agreement (MOA) – Joint Terminal Attack Controller (JTAC). The curriculum for this training is defined by a POI and CDD developed from a TECOM Marine Corps T & R Manual. The staff at EWTGLANT drafted a new DRAFT POI in response to the release of a new T & R Manual signed by TECOM in May 2011. This DRAFT POI is currently at HQMC TECOM awaiting approval and Commanding General, TECOM signature. The new DRAFT POI is one week longer than the current POI and is anticipated to incur additional annual recurring costs.

## **Project Objectives and Research Questions**

Our team will provide a Cost Benefit Analysis (CBA) of two COAs:

- COA 1 is to conduct initial JTAC Certification training at EWTGLANT using the current POI and curriculum.
- COA 2 is to conduct initial JTAC Certification training at EWTGLANT using a proposed DRAFT POI and curriculum.

In order to achieve the objective, the study will answer four questions:

1. What are the financial costs and benefits of the current curriculum?
2. What are the financial costs and benefits of the proposed curriculum?
3. What are the non-financial costs and benefits of the current curriculum?
4. What are the non-financial costs and benefits of the proposed curriculum?

### **Methodology**

By answering the four questions above, the team will address both the quantitative and qualitative costs and benefits of the current POI versus the proposed DRAFT POI and determine if the likely additional resources invested in creating the “end-product” of a JCAS AP MOA certified JTAC via the proposed DRAFT POI are worth the potential increased costs.

Our analyses will rely on a study that was conducted by the Center for Naval Analysis (CNA) in 2004 entitled the “Total Cost for Non-Aviator Joint Terminal attack Controller (JTAC) Policy” that addressed both the initial training cost and the sustainment cost of training non-aviators to serve as JTACs. The elements of this study applicable to initial training will be used as a template to construct this study.

In the last few years, EWTGLANT has been scheduling and conducting detailed data collection for the portion of the current curriculum which uses live resources in the same manner it will be scheduled in the proposed curriculum. The resources that have been consumed in the past two years that will be specified in the data listed below will be incorporated into the cost-benefit analysis of both the current curriculum and the proposed curriculum specified by the DRAFT POI.

Stakeholders are another source of data and they will be contacted for discussion on the costs and benefits of each COA. Insights from experts will be solicited from the Marine Corps Force Generation Element (FGE), Marine Corps and Navy units that receive newly trained JTACs and Marine Corps and Navy resource providers for aviation, ammunition, manpower, and funding.

To answer the research questions identified above, our team intends to collect and analyze the following specific data:

- a) Since costs and benefits of each COA are driven by the associated POI and curriculum, we will briefly explain the Marine Corps Systems Approach to Training (SAT) Program. The SAT is the Instructional Systems Design (ISD) system responsible for producing capabilities for the operating forces via training and is the system within which EWTGLANT must develop POI and curriculum as a FLC. Additionally, the more rigorous the design of the POI and curriculum the less variability allowed in the

execution of the course. Some differences between the two COAs will likely be attributed to stricter adherence to the ISD process. To assess the POI and curriculum differences the following references will be used:

- MCO 1553.2B dated 1 Apr 2011 - Management of Marine Corps Formal Schools and Training Detachments
- MCO P3500.72A Ground T & R Program dated 18 April 2005
- MCO 1553.1 dated 27 Oct 2010 – System Approach to Training (SAT) User’s guide
- Systems Approach to Training (SAT) Manual
- EWTGLANT Academics Standing Operating Procedures (SOP) dated 13 May 2011

b) To determine the financial costs and benefits of the current curriculum the following documents will be required:

- HQMC TECOM Interim Approved POI dated 23 October 2007
- HQMC TECOM T & R Manual dated 8 October 2008
- Current Course Program of Instruction (POI)
- Course Descriptive Data (CDD) – current POI
- Number of instructors required – current POI
- Number of simulators required – current POI
- Number of Aircraft (A/C) required to support JTAC training (Fixed Wing and Rotary Wing) – current POI
- Historical A/C support data for JTAC training in current curriculum to include T/M/S and Service [USN, USMC, and Contract Close Air Support (CCAS)] – current POI
- Average A/C transit times between origin airfield and training ranges used – current POI
- Overhead scheduled to account for student remediation and cancellations for weather and maintenance
- Cost Per-Flight-Hour for DOD A/C (by T/M/S and Service)
- FY-12 Cost of HQMC CCAS contract with Air USA (USMC CCAS contract winner)
- Non-Combat Expenditure Allowance (NCEA) required to support JTAC training - current POI
- Historical NCEA support data – current POI
- FY-12 cost of NCEA
- Ground ammunition required – current POI
- Ground ammunition expended in FY-12
- Number of students scheduled to be trained per year – current POI
- Number of students trained with resources received per FY – current POI
- Temporary Additional Duty (TAD) cost for Marine students
- TAD costs for Navy students
- Costs to the Marine Corps for International Students

c) To determine the financial costs and benefits of the proposed curriculum we will require the data listed above and the following:

- HQMC TECOM T & R Manual dated 13 May 2011
- Proposed DRAFT POI
- Course Descriptive Data (CDD) – proposed POI
- Number of instructors required – proposed POI
- Number of simulators required – proposed POI
- Number of A/C required to support JTAC training (Fixed Wing and Rotary Wing) – proposed POI
- Average A/C transit times between origin airfield and training ranges – proposed POI
- Overhead scheduled to account for student remediation and cancellations for weather and maintenance
- Cost Per-Flight-Hour for DOD A/C (by T/M/S and Service)
- FY-13 Cost of HQMC CCAS contract with Air USA (USMC CCAS contract winner)
- NCEA required to support JTAC training – proposed POI
- FY-13 cost of NCEA
- Ground ammunition required – proposed POI
- Number of students forecast to be trained per year – proposed POI

d) There are numerous documents that govern and / or have addressed JTAC training at EWTGLANT. These will contribute to the determination of the non-financial costs and benefits of the current curriculum and the proposed curriculum and provide formally recorded historical data for analysis:

- JCAS AP MOA – JTAC dated 1 January 2012
- Front End Analysis (FEA) Report 2005
- Front End Analysis (FEA) Report 2009
- Course Content Review Board Record of Proceedings (ROP) 2005
- Course Content Review Board Record of Proceedings (ROP) 2009
- Course Content Review Board Record of Proceedings (ROP) 2011
- All EWTGLANT Academics historical data pertinent to the TACP curriculum
- Marine Corps Combat Development Command (MCCDC) Operational Analysis Division (OAD) Study “The Application of Simulators and Simulation in JTAC Training” dated 9 Aug 2006  
NOTE: contains comments from ~250 FACs and JTACs regarding their training
- Marine Corps Studies System Category II Study: CBA for changing training to incorporate current TTP’s into JTAC training dated 2009
- Marine Corps Warfighting Lab (MCWL) Analysis Report “How Should the USMC select JTACs?” dated May 2006  
Note: Analysis states USMC “must” increase the standardization of JTAC training

- USSOCOM sponsored study by JACOBS - “JTAC: Study Replacing Live Controls with Simulated Controls” dated 29 Sept 2011  
Note: This study conducted a scholarly, external, third-party examination of EWTGLANT JTAC training in comparison to other DOD schools that provide the same training.
- TACP End-of-Course (EOC) critiques from students attending TACP from Oct 2010 - Nov 2012
- Course Manager Comments from TACP End-of-Course Books from Oct 2010 – Nov 2012

e) In addition to the resources identified in paragraph (d), discussions will be conducted with subject-matter-experts (SMEs) to gain clarity and insight about the financial and non-financial costs and benefits of the current and proposed DRAFT POI & curriculum. These experts will include:

- Joint Staff, J-8, Joint Fires Division
- HQMC Aviation Plans and Policy (APP) - 36
- HQMC Plans, Policy, and Operations (PP&O) Ground Combat Element Branch (POG) - 70
- HQMC Manpower Management Officer Assignments (MMOA) - 2
- Marine Corps Security Cooperation Group (MCSCG)
- Marine Forces Command (MARFORCOM) Training
- Marine Forces Command (MARFORCOM) Aviation Logistics Division (ALD)
- HQMC TECOM TACP Task Analyst
- HQMC TECOM Training Development and Analysis Branch Head
- HQMC TECOM Front-End Analysis (FEA) Analyst (TACP)
- COMNAVAIRLANT Current Readiness Office
- Commander Strike Fighter Wing, Atlantic (CSFWL) N-3
- Naval Strike and Air Warfare Center (NSAWC) Close Air Support (CAS) / Forward Air Controller – Airborne (FAC-A) Program Manager
- Strike Fighter Weapons School, Atlantic (SFWSL)
- USMC Fixed Wing Liaison Officer, Naval Air Warfare Development Command  
Note: Marine representative at simulator development facility in Orlando, FL
- MAWTS-1 Air Officer Department (AOD)
- Commander Strike Force Training, Atlantic (CSFTL) N-3
- EWTGLANT TACP Course Chief (Current)
- EWTGLANT TACP Course Chief (Former)
- EWTGLANT N-8 (Fires Division) Department Head (Current)
- EWTGLANT N-8 (Fires Division) Department Head (Former)
- EWTGLANT N-8 (Fires Division) Deputy Department Head
- EWTGLANT Academics Department
- Expeditionary Warfare Training Group, Pacific (EWTGPAC) TACP Course Chief

- EWTGPAC N-8 (Fires Division) Department Head
- II Marine Expeditionary Force (MEF) Air Officer
- II MEF Ground Ammunition Officer
- 2d Air-Naval Gunfire Liaison Officer (ANGLICO) Air Officer
- 2D Marine Division (MARDIV) Air Officer
- 2D MARDIV Ground Ammunition Officer
- 2D Reconnaissance Battalion Air Officer
- 10<sup>th</sup> Marines Regimental Air Officer
- Marine Special Operations Command (MARSOC) Air Officer

### Scope

This project will focus on the significant cost drivers identified in the 2004 Center for Naval Analysis Report “The Total Cost for Non-Aviator Joint Terminal Attack Controller Policy”: Aviation sorties, Non-Combat Expenditure Allowance (NCEA) (ie- aviation ordnance), Indirect Fire Ammunition, and Temporary Additional Duty (TAD) funding. We will focus strictly on initial certification training at EWTGLANT and the two COAs described above, as they exist currently. No changes to either the current POI or the DRAFT POI will be proposed.

Resource expenditure data from 1<sup>st</sup> quarter FY 11 through 1<sup>st</sup> quarter FY 13 will be used to identify the quantitative cost of the current POI. Forecast resource expenditure for the proposed POI will be calculated in FY 13 dollars.

We will not consider the cost of pre-requisite training packages that are determined by varying Target Population Description (TPD), follow-on sustainment training within the fleet, or Distance Learning (DL). The cost of developing the DL will not be included as there are a wide range of options from a “fully contracted” DL to an internally maintained, self-updated DL that vary widely in price and quality.

Our analysis will not consider the Close Air Support Training Ranges facilities maintenance or any costs associated with any Marine Corps Installations Command (MCI) activity nor will it include schoolhouse facilities overhead (N-4, N-6, N-9, etc) or the cost of maintaining the EWTGLANT vehicle fleet.

The cost of assault support sorties (Rotary Wing Assault Support and Aerial Refueling Tanker sorties) will not be included nor will the cost of placing supporting units in the field for the evaluation week in the field (ie- road miles, fuel, MRE’s, batteries, etc).

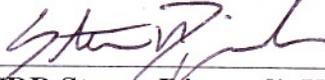
## Timetable

<b>Task</b>	<b>Duration</b>	<b>Start</b>	<b>Finish</b>
Team background brief on: <ul style="list-style-type: none"> <li>- JCAS AP MOA - JTAC governing documents</li> <li>- TECOM, Training Command, and EWTGLANT mission and governing documents</li> <li>- Systems Approach to Training (SAT) curriculum development process Analysis and Design phases</li> </ul>	1 day	Dec 16	Dec 16
Draft proposal	22 days	Dec 21	Jan 12
Finalize proposal	2 days	Jan 12	Jan 14
Meet with client & deliver proposal	1 day	Jan 15	Jan 15
Obtain quantitative items for comparison between the current and draft POIs	10 days	Jan 15	Jan 25
Develop baseline questions for the SME & stakeholder interviews	10 days	Jan 15	Jan 25
Organize and format all aircraft data for FY 11 – FY 13 from Live Fire Data Roll-ups (.xls)	10 days	Jan 15	Jan 25
Organize and format all aviation ordnance data (NCEA) for FY 11 – FY 13 from Live Fire Data Roll-ups (.xls)	10 days	Jan 15	Jan 25
Review: <ul style="list-style-type: none"> <li>- JTAC training governing documents</li> <li>- Applicable HQMC TECOM curriculum development orders and directives</li> <li>- Historical EWTGLANT TACP curriculum development documents</li> </ul>	28 days	Jan 15	Feb 12
Interview SMEs & stakeholders	19 days	Jan 25	Feb 12
Organize and format all Indirect Fire (IDF) ammunition allocation and expenditure data ISO EWTGLANT from MARFORCOM, TECOM, II MEF & 2D MARDIV for FY 11 – FY 13	7 days	Jan 25	Feb 01
Collect: <ul style="list-style-type: none"> <li>- Cost-per flight-hour data for all military Type / Model / Series aircraft (F/A-18 A+,C,D,E,F; AV-8B; AH-1; UH-1)</li> <li>- Contracting cost data for Contact Close Air Support (CCAS)</li> <li>- Navy Ammunition Logistics Code (NALC) cost data for NCEA</li> <li>- Cost data for indirect IDF ammunition</li> </ul>	7 days	Jan 25	Feb 01
Analyze data, conduct follow on interviews, develop draft report and presentation	20 days	Feb 12	Mar 04
Submit rough draft of report and presentation for review	1 day	Mar 04	Mar 04
Develop final report and presentation	7 days	Mar 04	Mar 11
Submit final report and presentation	1 day	Mar 11	Mar 11
Brief Client	8 days	Mar 11	Mar19

**Conclusion**

The increasingly competitive nature of the budgetary environment means that increased scrutiny will be applied to any decisions involving money and training. We are confident this project will increase awareness about the quantitative and qualitative costs and benefits and facilitate a well-informed decision. If this proposal satisfies your requirements please return a signed copy and retain one copy for your records. We look forward to supporting the EWTGLANT Mission.

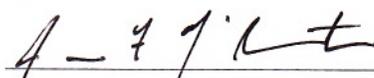
**Oceana 1 Consulting Team**

  
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**CDR Steven Djunaedi, USN**

  
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**Major Peter J. Guerrant, USMC**

  
\_\_\_\_\_  
**LCDR Richard Stafford, USN**

**EWTGLANT, DOT**

  
\_\_\_\_\_  
**Colonel James McGrath, USMC**

**Final  
Report  
Brief  
(.ppt)**



NAVAL  
POSTGRADUATE  
SCHOOL



# Cost Benefit Analysis of EWTGLANT FAC / JTAC Training Options

Presentation for: Col James McGrath, USMC

Date: 19 March 2013

Oceana 1 Consulting

CDR Steven Djunaedi, USN

Major Peter J. Guerrant, USMC

LCDR Rich Stafford, USN

Dr. Frank R. “Chip” Wood, Sr. Consultant

# This presentation includes:

## 1. Project

- Background
- Objectives
- Scope
- Methodology

## 2. Results

- POI Comparison
- Significant Findings

## 3. Recommendations & Conclusions

# Project Background

- TACP Course taught at EWTGLANT to produce certified FACs / JTACs IAW JCAS AP MOA
- EWTGLANT produced a proposed POI in response to new T&R Manual, 13 May 2011
- Proposed POI currently in staffing

# Project Objectives

- Cost Benefit Analysis of two COAs:
  - COA 1: Conduct initial JTAC certification IAW current POI
  - COA 2: Conduct initial JTAC certification IAW the proposed POI
- Research Questions:
  - Financial and non-financial costs and benefits of the current curriculum?
  - Financial and non-financial costs and benefits of the proposed curriculum?

# Project Scope

- Focused strictly on initial certification training at EWTGLANT and the two COAs
- Did not address:
  - Intermediate options
  - Cost of any pre-requisite training packages
  - Sustainment training
  - Cost of updated Distance Learning modules
  - Costs associated with CAS ranges
  - Schoolhouse facilities overhead
  - Cost of assault support sorties
  - Cost of supporting ground units in the field

# Project Methodology

- Collect and analyze cost data (FY11-FY12)
  - Aviation sorties
  - NCEA
  - Ground Ammunition
  - TAD funding
- Collect and analyze comments from experts
  - SMEs from all portions (Joint Staff, USMC and USN) of initial JTAC certification systems-process: inputs, processes, and outputs



# Results

- POI Comparison
  - Current
  - Proposed
- Significant Findings
  - Current Curriculum
    - Costs
    - Benefits
  - Proposed POI
    - Costs
    - Benefits

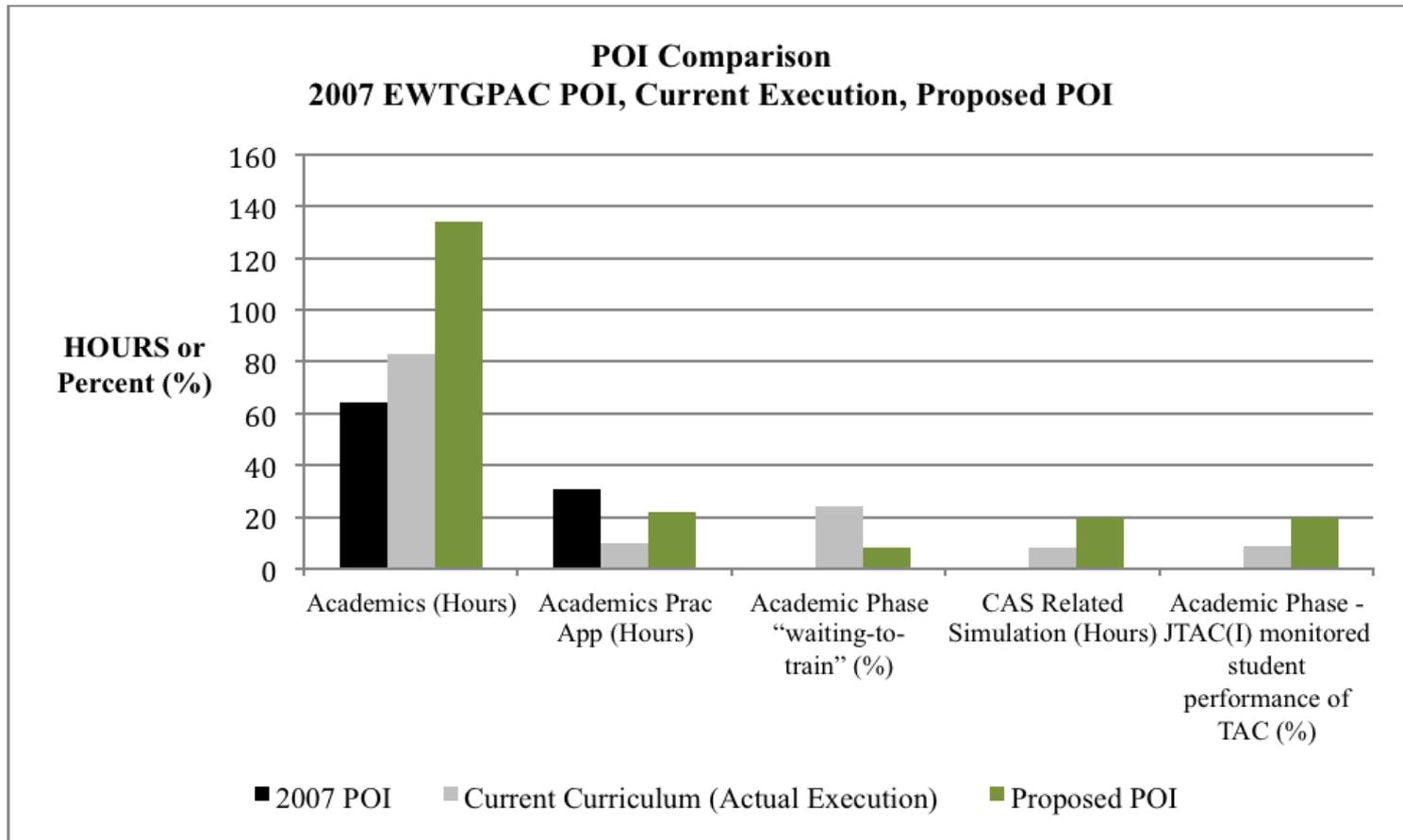
# Results

- Current POI
  - ✓ None found
  - ✓ Unspecified readiness output achieves ~55% JMTL tasks
  - ✓ Academic hours have increased and academic practical application has decreased
  - ✓ Enormous amount of flexibility for determination and utilization of required resources

# Results

- Proposed POI
  - ✓ No increase in live resources
  - ✓ Requires more aviator instructors
  - ✓ Specified output achieves ~80% JMTL tasks
  - ✓ Increased academic hours & practical application
  - ✓ Increased simulation hours & and JTAC(I) monitored student training
  - ✓ Incurs reduced flexibility for determination and utilization of required resources

# Results



# Results

	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b>Aviation Cost per-student</b>	\$78,393.40 - average FY11 & FY12	\$58,809.22
<b>NCEA Cost per student</b>	\$13,839.12 *actual expenditure per student for FY 11 and 12	\$19,819.38 * least expensive sourcing option
<b>Ground Ammunition Cost per student</b>	\$59,781.90	\$31,881.18
<b>TAD Cost per student</b>	\$3,574.00	\$4,467.50
<b>EWI GLANT Cost-per-JTAC</b>	<b>\$155,588.42</b>	<b>\$114,977.28</b>

# Results

COA	COST	BENEFIT
<p><b>Maintain Current Curriculum</b></p>	<ul style="list-style-type: none"> <li>• Potentially Incomplete Training</li> <li>• Unspecified Readiness Output</li> <li>• Unspecified Curriculum</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility</li> </ul>
<p><b>Adopt Proposed Curriculum</b></p>	<ul style="list-style-type: none"> <li>• Potentially incomplete Training</li> <li>• Potentially insufficient ISD / SAT Process FEA</li> <li>• Specified Resource Requirement</li> <li>• Increased TAD Costs</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate Cost Estimates</li> </ul>

# Results

- Current Curriculum - Costs

COA	COST	BENEFIT
<b>Maintain Current Curriculum</b>	<ul style="list-style-type: none"><li>• Potentially Incomplete Training</li><li>• Unspecified Readiness Output</li><li>• Unspecified Curriculum</li></ul>	<ul style="list-style-type: none"><li>• Flexibility</li></ul>
<b>Adopt Proposed Curriculum</b>	<ul style="list-style-type: none"><li>• Potentially incomplete Training</li><li>• Potentially insufficient ISD / SAT Process FEA</li><li>• Specified Resource Requirement</li><li>• Increased TAD Costs</li></ul>	<ul style="list-style-type: none"><li>• Accurate Cost Estimates</li></ul>

# Current Curriculum Cost #1

## Potentially Incomplete Training

- 55% JCAS AP MOA JMTL Tasks to standard

# Current Curriculum Cost #2

## Unspecified Readiness Output

- “Combat Capable”?
- Completed an “Exposure event”?
- “Certified” IAW the JCAS AP MOA?
- Waivers

# Current Curriculum Cost # 3

## Unspecified Curriculum

- Idiosyncratic: two periods on opposite sides of EWTGLANT instructor turnover depicted

Note: EWTGPAC “4 week” POI dated Oct 2007 specifies 65 Hours of Academics (34.5 Lecture / 30.5 Practical Application)	TACP 1-08 through 2-13 (Period of 4 week Course)	TACP 1-12 through 2-13 (Period of ~Stabilization of Current Curriculum)
<b>Average Academic Hours / Student</b>	84.21	81.53
<b>Standard Deviation</b>	7.85	1.38
<b>Average Simulator Hours / Student</b>	7.86	8.3
<b>Standard Deviation</b>	0.95	0.27
<b>Academic Training Days (Equivalent “8 hour” training days)</b>	11.51	11.23
<b>% student time “waiting to train” - Academics</b>	23.27%	25.14%
<b>Live Fire Training hours</b>	4.5 hours	4.5 hours
<b>Total Effective Training Days (Equivalent “8 hour” training days)</b>	12.07	11.79
<b>% student time “waiting-to-train” - Total</b>	39.64%	41.04%

# Results

- Current Curriculum - Benefits

COA	COST	BENEFIT
<b>Maintain Current Curriculum</b>	<ul style="list-style-type: none"> <li>• Potentially Incomplete Training</li> <li>• Unspecified Readiness Output</li> <li>• Unspecified Curriculum</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility</li> </ul>
<b>Adopt Proposed Curriculum</b>	<ul style="list-style-type: none"> <li>• Potentially incomplete Training</li> <li>• Potentially insufficient ISD / SAT Process FEA</li> <li>• Specified Resource Requirement</li> <li>• Increased TAD Costs</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate Cost Estimates</li> </ul>

# Current Curriculum Benefit #1

## Flexibility

- Flexibility readily accounts for:
  - Production pressures
  - Resource reductions
  - Time constraints

“...the main concern from the (resource provider) perspective is retaining flexibility in the (JTAC certification) program to produce the maximum number of qualified JTACS during a time when the requirement remains high.”

# Results

- Proposed POI - Costs

COA	COST	BENEFIT
<b>Maintain Current Curriculum</b>	<ul style="list-style-type: none"><li>Potentially Incomplete Training</li><li>Unspecified Readiness Output</li><li>Unspecified Curriculum</li></ul>	<ul style="list-style-type: none"><li>Flexibility</li></ul>
<b>Adopt Proposed Curriculum</b>	<ul style="list-style-type: none"><li>Potentially incomplete Training</li><li>Potentially insufficient ISD / SAT Process FEA</li><li>Specified Resource Requirement</li><li>Increased TAD Costs</li></ul>	<ul style="list-style-type: none"><li>Accurate Cost Estimates</li></ul>

# Proposed POI Cost #1

## Potentially Incomplete Training

- 80% JCAS AP MOA JMTL Tasks to standard

# Proposed POI Cost #2

Potentially Incomplete ISD / SAT Process FEA

- JCAS AP MOA 100% answer never achieved
- Non-Terminal Attack Control skills omitted
- Were these skills expected of the fleet?

# Proposed POI Cost # 3

## Specific Resource Requirement

- Current curriculum flexibility removed

# Proposed POI Cost # 4

## Increased TAD Costs

- Resource stakeholders
  - Best Cast – Total Savings > \$40,000 per student
  - Worst Case – Status Quo
- TECOM incurs certain increased TAD Costs
- TECOM is decision authority

# Results

- Proposed POI - Benefits

COA	COST	BENEFIT
<b>Maintain Current Curriculum</b>	<ul style="list-style-type: none"><li>Potentially Incomplete Training</li><li>Unspecified Readiness Output</li><li>Unspecified Curriculum</li></ul>	<ul style="list-style-type: none"><li>Flexibility</li></ul>
<b>Adopt Proposed Curriculum</b>	<ul style="list-style-type: none"><li>Potentially incomplete Training</li><li>Potentially insufficient ISD / SAT Process FEA</li><li>Specified Resource Requirement</li><li>Increased TAD Costs</li></ul>	<ul style="list-style-type: none"><li>Accurate Cost Estimates</li></ul>

# Proposed POI Benefit #1

Accurate Cost Estimate

Specified Readiness Level and Training Standard

=

Structured Training + SPECIFIED RESOURCES

- Specified Resources enable accurate cost estimates

# Results

COA	COST	BENEFIT
<b>Maintain Current Curriculum</b>	<ul style="list-style-type: none"><li>• Potentially Incomplete Training</li><li>• Unspecified Readiness Output</li><li>• Unspecified Curriculum</li></ul>	<ul style="list-style-type: none"><li>• Flexibility</li></ul>
<b>Adopt Proposed Curriculum</b>	<ul style="list-style-type: none"><li>• Potentially incomplete Training</li><li>• Potentially insufficient ISD / SAT Process FEA</li><li>• Specified Resource Requirement</li><li>• Increased TAD Costs</li></ul>	<ul style="list-style-type: none"><li>• Accurate Cost Estimates</li></ul>



# Recommendations

- Recommendation 1
  - Adopt Proposed POI
- Recommendation 2
  - Systematically Define Requirement

# Conclusion

- Current paradigm of “controls based” FAC / JTAC training is not efficient or effective training
- Proposed POI = “skills based training”
- “Skills based training” of Proposed POI or disciplined ISD / SAT Process to identify an alternative POI is a gateway to simulation
  - cost savings
  - increased combat effectiveness

# Conclusion

Determination of the readiness level and the standard is needed as a pre-requisite to the determination of:

- *How to train*
- *Who to train*
- *What to train*
- *What resources are required to train*



# BACK-UP SLIDES

# Results – POI Comparison

	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b># Weeks Total</b>	4 Weeks - 15 days Academics / Simulator - 5 days “Live Fire”	5 weeks - 21 days Academics / Simulator - 4 days “Live Fire”
<b>Classification Level</b>	UNCLASSIFIED	SECRET-NOFORN
<b># Instructors</b>	8 * EWTGLANT TACP currently has 3 instructors from CAS-providing platforms	10 *Aviators from CAS-providing platforms are critical to effectiveness of simulation presentations and prevention of negative transfer of learning to the student.
<b>FY Student Capacity</b>	144	144
<b>JCAS AP MOA JMTLs Tasks Achieved</b>	55%	80%
<b>Academic Instructional Hours</b>	Average 84.20 hours Standard deviation of 7.85 hours	~ 134 hours
<b>Fluctuation of Academic Instructional Hours</b>	Apex – 98.5 hours Nadir – 69 hours	Controlled by POI
<b>Practical Application Hours</b>	~ 10 hours	~ 22 hours - Additional Practical Application embedded with instruction
<b>Simulation Hours</b>	Average 7.86 hours Standard deviation of 0.95	~ 20 hours *Aviators from CAS-providing platforms are critical to effectiveness of simulation presentations and prevention of negative transfer of learning to the student.

# Results – POI Comparison

	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b>Percentage of Academic Phase JTAC(I) monitored student performance of Terminal Attack Controller skills</b>	~ 9%	~ 20%
<b>Percentage of Academic Phase “waiting-to-train”</b>	~ 24%	~ 8%
<b>Written Exams</b>	1 Final Exam	3 Phase Exams Conducted at end of 1 <sup>st</sup> 3 phases - Planning - Planning & Briefing - Planning, Briefing & Execution
<b>Performance Evaluation</b>	1 x TAC-CHK-1190	19 Performance Evaluations: 16 Conducted at end of 1 <sup>st</sup> 3 phases: - 8 x Planning, - 4 x Planning & Briefing, - 4 x Planning, Briefing & Execution Comprehensive “Live Fire” evaluation: - 3 x 30 min Live-Fire evaluation

# Results – POI Comparison

	<b>Current Curriculum</b>	<b>Proposed Curriculum</b>
<b>Aviation Cost per-student</b>	\$78,393.40 - average FY11 & FY12	\$58,809.22
<b>NCEA Cost per student</b>	\$13,839.12 *actual expenditure per student for FY 11 and 12	\$19,819.38 * least expensive sourcing option
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<b>EWI GLANT Cost-per-JTAC</b>	<b>\$155,588.42</b>	<b>\$114,977.28</b>

# Academic Data Example

## TACP 1-12

1st week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	2nd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	3rd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	Academics Total	Sim Total
Mon	8.5				Mon	LIBERTY				Mon	9.5			1116	82.5	29.5
Tues	9				Tues	4.5	2		1113	Tues	0	2	3.5	1118		
Wends	8				Wends	6	2		1112	Wends	5	3		1119		
Thurs	9				Thurs	6	4.5	3	1134 & 1114	Thurs	3.5	1.5		1120 & 1117		
Fri	4.5	4		1110 & 1111	Fri	5	2		1115	Fri	4	2				

## TACP 2-12

1st week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	2nd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	3rd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	Academics Total	Sim Total
Mon	8.5				Mon	LIBERTY				Mon	0	3.5	2	1116 & 1118	82	25
Tues	9				Tues	4.5	2		1113	Tues	9.5					
Wends	8				Wends	6	2		1112	Wends	5	3		1119		
Thurs	9				Thurs	6	3		1114	Thurs	3.5	1.5	2	1120 & 1117		
Fri	4.5	4		1110 & 1111	Fri	4	2		1115	Fri	4.5					

## TACP 3-12

1st week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	2nd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	3rd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	Academics Total	Sim Total
Mon	8.5				Mon	5	2		1113	Mon	1.5	3.5		1119	80	25.67
Tues	8				Tues	4.5	3.5		1112	Tues	8.5					
Wends	8.5				Wends	7	2		1114	Wends	0.5	2	3.5	1116 & 1118		
Thurs	9				Thurs	6	1	2.17	1120 & 1115	Thurs	2	2		1117		
Fri	4.5	4		1110 & 1111	Fri	6.5				Fri	BASE EXERCISE					

## TACP 4-12

1st week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	2nd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	3rd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	Academics Total	Sim Total
Mon	8.5				Mon	4	2		1113	Mon	1	3.5		1119	81	25.5
Tues	8				Tues	5	3.5		1112	Tues	9.5					
Wends	8.5				Wends	6.5	2		1114	Wends	0	2	3.5	1116 & 1118		
Thurs	9				Thurs	5	2		1115	Thurs	1.5	2		1117		
Fri	4.5	4		1110 & 1111	Fri	5.5	1		1120	Fri	4.5					

## TACP 5-12

1st week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	2nd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	3rd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	Academics Total	Sim Total
Mon	8.5				Mon	4	2		1113	Mon	1.5	4		1119	79.5	26.5
Tues	8				Tues	4.5	3.5		1112	Tues	9.5					
Wends	8.5				Wends	6.5	2		1114	Wends	0	2	4	1116 & 1118		
Thurs	9				Thurs	4.5	2		1115	Thurs	1.5	2		1117		
Fri	4.5	4		1110 & 1111	Fri	5.5	1		1120	Fri	3.5					

## TACP 6-12

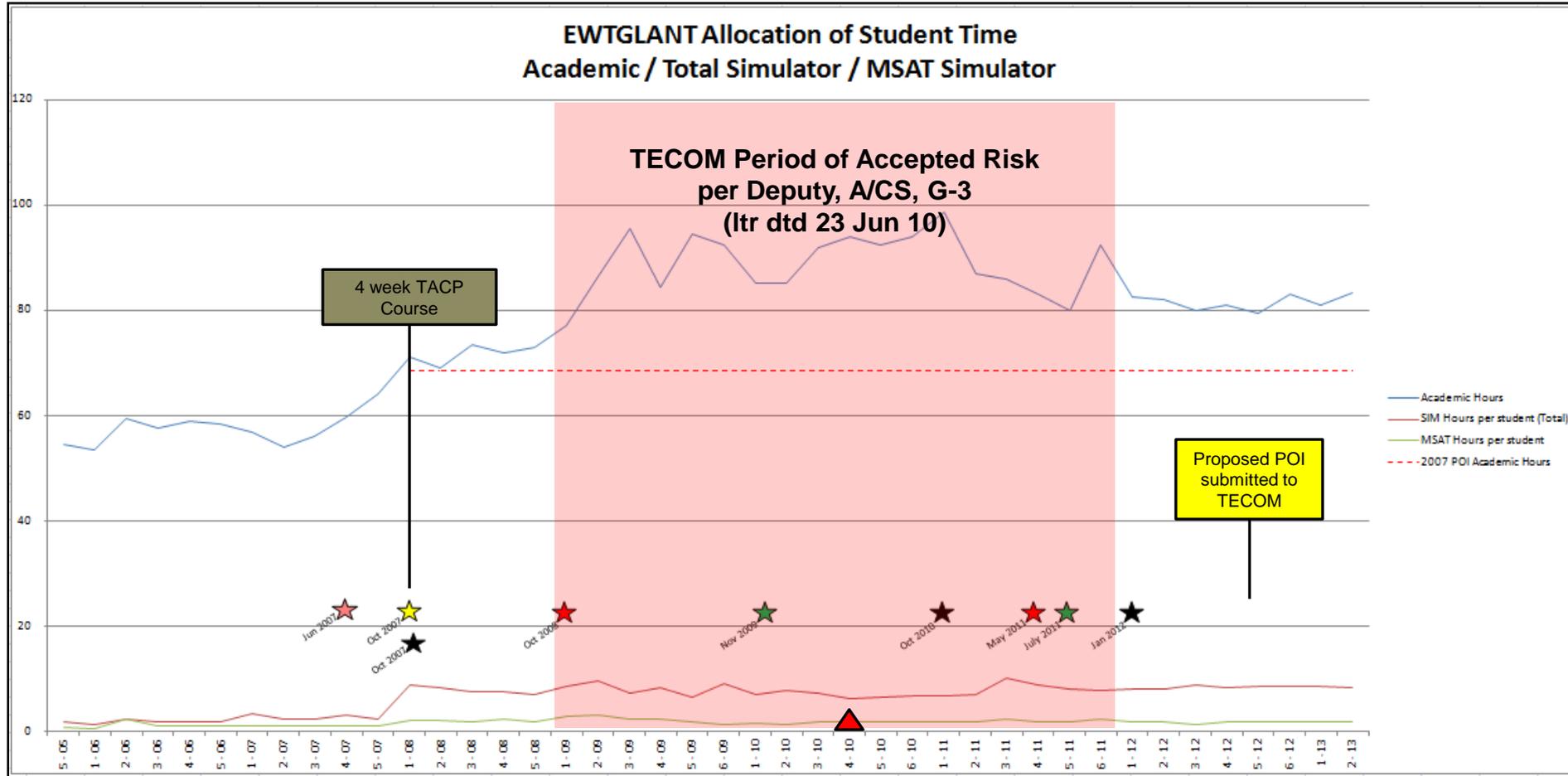
1st week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	2nd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	3rd week	Academic hrs	CAS Sim hrs	CAS Sim hrs	Event(s)	Academics Total	Sim Total
Mon	8.5				Mon	4	2		1113	Mon	4	4		1119	83	26.5
Tues	8				Tues	5	3.5		1112	Tues	9.5					
Wends	8.5				Wends	6.5	2		1114	Wends	0	2	4	1116 & 1118		
Thurs	9				Thurs	4.5	2		1115	Thurs	1.5	2		1117		
Fri	4.5	4		1110 & 1111	Fri	6	1		1120	Fri	3.5					

# Simulator Data Example

TACP 1-12	4	4	12	DVTE	1110 & 1111	1.33	0.00			
TACP 1-12	1	4	4	DVTE	1113 pt 1	1.00	0.00			
TACP 1-12	1	1	4	MSAT	1113 pt 2	0.25	0.25			
TACP 1-12	2	4	12	DVTE	1112	0.67	0.00			
TACP 1-12	3	4	12	DVTE	1114	1.00	0.00			
TACP 1-12	4.5	1	12	DVTE	1134	0.38	0.00			
TACP 1-12	2	2	4	MSAT	1115	0.50	0.50			
TACP 1-12	2	2	4	MSAT	1116	0.50	0.50			
TACP 1-12	3.5	2	8	outside (JEB)	1118	0.88	0.00			
TACP 1-12	3	2	8	outside (JEB)	1119	0.75	0.00			
TACP 1-12	1.5	1	8	DVTE	1120	0.19	0.00			
TACP 1-12	2	2	4	MSAT	1117	0.50	0.50	TACP 1-12	7.94	1.75
TACP 2-12	4	4	12	DVTE	1110 & 1111	1.33	0.00			
TACP 2-12	1	4	4	DVTE	1113 pt 1	1.00	0.00			
TACP 2-12	1	1	4	MSAT	1113 pt 2	0.25	0.25			
TACP 2-12	2	4	12	DVTE	1112	0.67	0.00			
TACP 2-12	4.5	1	12	DVTE	1134	0.38	0.00			
TACP 2-12	3	4	12	DVTE	1114	1.00	0.00			
TACP 2-12	2	2	4	MSAT	1115	0.50	0.50			
TACP 2-12	2	2	4	MSAT	1116	0.50	0.50			
TACP 2-12	3.5	2	8	outside (JEB)	1118	0.88	0.00			
TACP 2-12	3	2	8	outside (JEB)	1119	0.75	0.00			
TACP 2-12	1.5	1	8	DVTE	1120	0.19	0.00			
TACP 2-12	2	2	4	MSAT	1117	0.50	0.50	TACP 2-12	7.94	1.75
TACP 3-12	4	4	12	DVTE	1110 & 1111	1.33	0.00			
TACP 3-12	1	4	4	DVTE	1113 pt 1	1.00	0.00			
TACP 3-12	1	1	4	MSAT	1113 pt 2	0.25	0.25			
TACP 3-12	3.5	4	12	DVTE	1112	1.17	0.00			
TACP 3-12	4.5	1	12	DVTE	1134	0.38	0.00			
TACP 3-12	2	4	12	DVTE	1114	0.67	0.00			
TACP 3-12	1	1	12	DVTE	1120	0.08	0.00			
TACP 3-12	2.17	1	2	outside (JEB)	1115	1.09	0.00			
TACP 3-12	3.5	2	8	outside (JEB)	1119	0.88	0.00			
TACP 3-12	2	2	4	MSAT	1116	0.50	0.50			
TACP 3-12	3.5	2	8	outside (JEB)	1118	0.88	0.00			
TACP 3-12	2	2	4	MSAT	1117	0.50	0.50	TACP 3-12	8.71	1.25
TACP 4-12	4	4	12	DVTE	1110 & 1111	1.33	0.00			
TACP 4-12	1	4	4	DVTE	1113 pt 1	1.00	0.00			
TACP 4-12	1	1	4	MSAT	1113 pt 2	0.25	0.25			
TACP 4-12	3.5	4	12	DVTE	1112	1.17	0.00			
TACP 4-12	4.5	1	12	DVTE	1134	0.38	0.00			
TACP 4-12	2	4	12	DVTE	1114	0.67	0.00			
TACP 4-12	2	2	4	MSAT	1115	0.50	0.50			
TACP 4-12	1	1	8	DVTE	1120	0.13	0.00			
TACP 4-12	3.5	2	8	outside (JEB)	1119	0.88	0.00			
TACP 4-12	2	2	4	MSAT	1116	0.50	0.50			
TACP 4-12	3.5	2	8	outside (JEB)	1118	0.88	0.00			
TACP 4-12	2	2	4	MSAT	1117	0.50	0.50	TACP 4-12	8.17	1.75
TACP 5-12	4	4	12	DVTE	1110 & 1111	1.33	0.00			
TACP 5-12	1	4	4	DVTE	1113 pt 1	1.00	0.00			
TACP 5-12	1	1	4	MSAT	1113 pt 2	0.25	0.25			
TACP 5-12	3.5	4	12	DVTE	1112	1.17	0.00			
TACP 5-12	4.5	1	12	DVTE	1134	0.38	0.00			
TACP 5-12	2	4	12	DVTE	1114	0.67	0.00			
TACP 5-12	2	2	4	MSAT	1115	0.50	0.50			
TACP 5-12	1	1	8	DVTE	1120	0.13	0.00			
TACP 5-12	4	2	8	outside (JEB)	1119	1.00	0.00			
TACP 5-12	2	2	4	MSAT	1116	0.50	0.50			
TACP 5-12	4	2	8	outside (JEB)	1118	1.00	0.00			
TACP 5-12	2	2	4	MSAT	1117	0.50	0.50	TACP 5-12	8.42	1.75
TACP 6-12	4	4	12	DVTE	1110 & 1111	1.33	0.00			
TACP 6-12	1	4	4	DVTE	1113 pt 1	1.00	0.00			
TACP 6-12	1	1	4	MSAT	1113 pt 2	0.25	0.25			
TACP 6-12	3.5	4	12	DVTE	1112	1.17	0.00			
TACP 6-12	4.5	1	12	DVTE	1134	0.38	0.00			
TACP 6-12	2	4	12	DVTE	1114	0.67	0.00			
TACP 6-12	2	2	4	MSAT	1115	0.50	0.50			
TACP 6-12	1	1	8	DVTE	1120	0.13	0.00			
TACP 6-12	4	2	8	outside (JEB)	1119	1.00	0.00			
TACP 6-12	1	1	8	DVTE	1120	0.13	0.00			
TACP 6-12	4	2	8	outside (JEB)	1119	1.00	0.00			
TACP 6-12	2	2	4	MSAT	1116	0.50	0.50			
TACP 6-12	4	2	8	outside (JEB)	1118	1.00	0.00			
TACP 6-12	2	2	4	MSAT	1117	0.50	0.50	TACP 6-12	8.42	1.75

# Curriculum Development Timeline

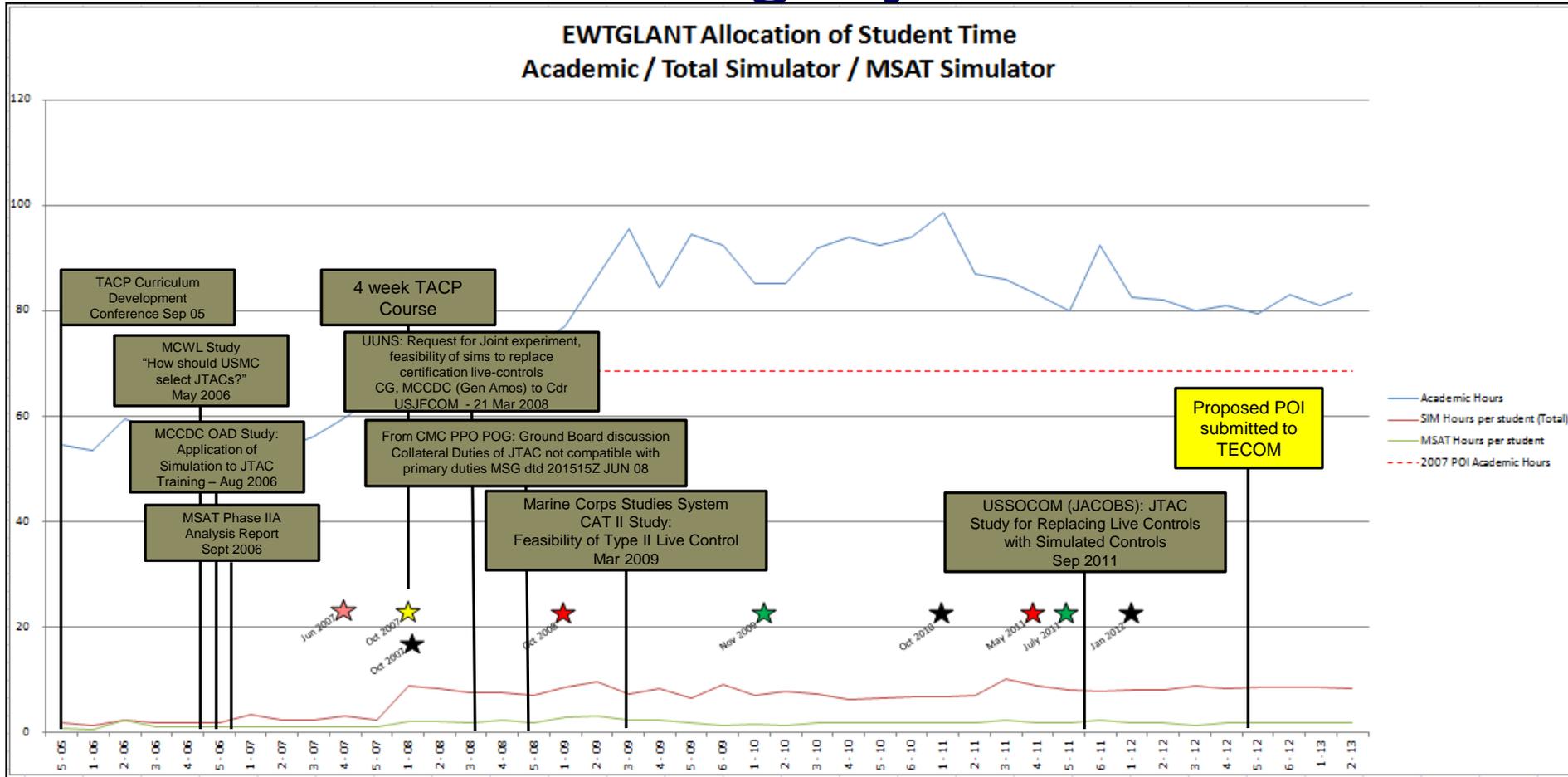
**EWTGLANT Allocation of Student Time  
Academic / Total Simulator / MSAT Simulator**



Red – Signed T & R Manual  
 > Faded Red - Interim Approved T & R Manual  
 Gold – EWTGPAC 2007 Interim Approved POI  
 Black – JCAS AP MOA  
 Green – TACP CCRB

# Potentially Unresponsive Training System

EWTGLANT Allocation of Student Time  
Academic / Total Simulator / MSAT Simulator

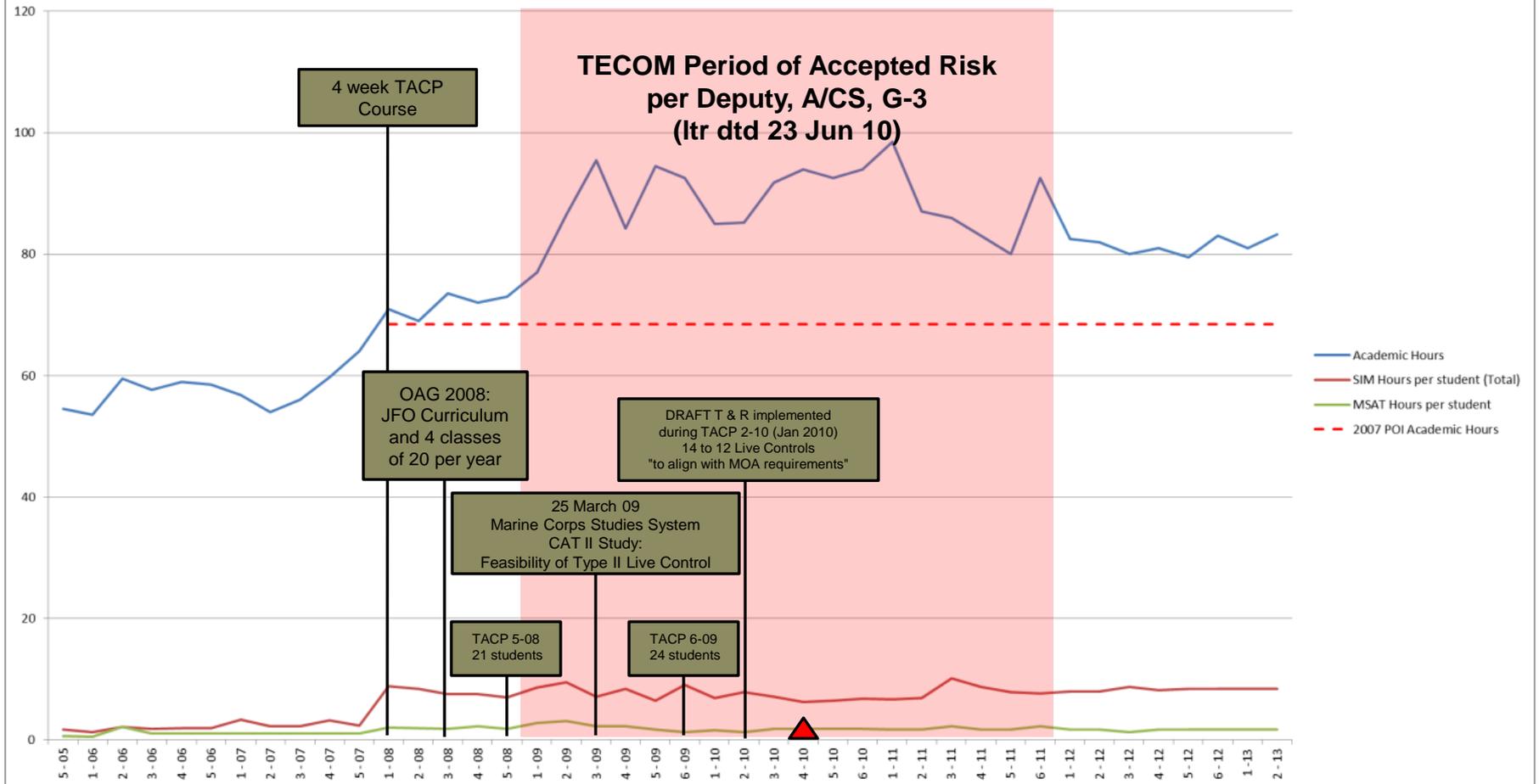


Red - Signed T & R Manual  
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 Gold - EWTGPAC 2007 Interim Approved POI  
 Black - JCAS AP MOA  
 Green - TACP CCRB

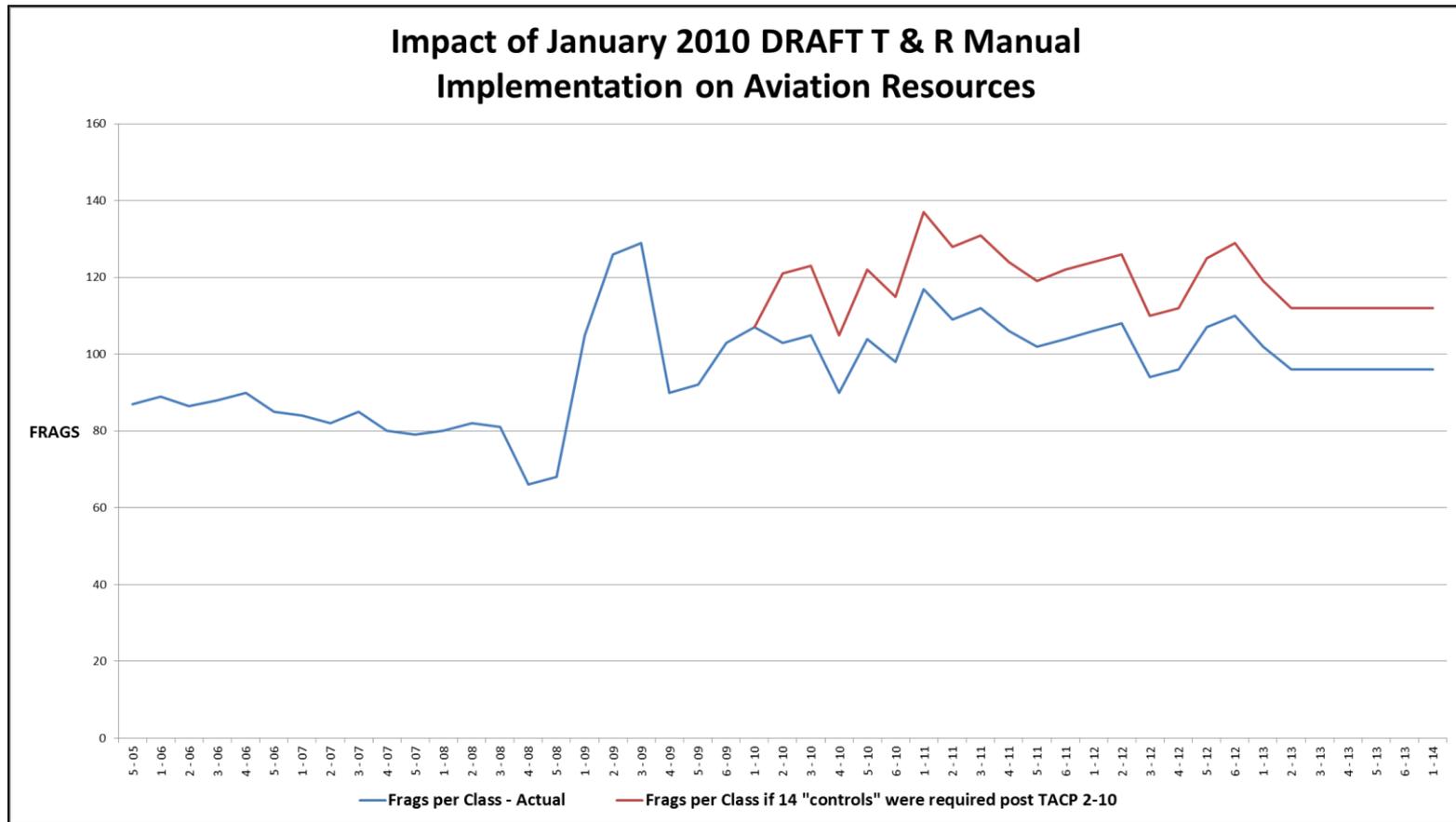


# Potential Production Strain

**EWTGLANT Allocation of Student Time  
Academics / Total Simulator / MSAT Simulator**



# Potential Production Strain



January 2010 implementation of DRAFT T & R Manual enabled production of 24 students per-class with ~14.5% less requested FRAGS (i.e. Aviation Resources) than required by signed existing T & R Manual of October 2008