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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2)				July 2001	
OPERATIONAL TEST AND EVALUATION, DEFENSE (0460) BUDGET ACTIVITY SIX			LIVE FIRE TESTING PE 0605131D8Z		
\$'s in Millions	FY 2000	FY 2001	FY 2002	COST TO COMPLETE	TOTAL COST
PE 0605131D	16.669	17.054	9.887	Continuing	Continuing

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION

This program element, 0605131D8Z, directly supports the Congressional statutory requirements for oversight of Live Fire Test and Evaluation (LFT&E). The Federal Acquisition Streamlining Act of 1994 amended Title 10 to transfer, within the Office of the Secretary of Defense, responsibility for monitoring and reviewing the live fire testing activities of the Department of Defense. Responsibility was reassigned from the Director of Test, Systems, Engineering and Evaluation, Office of the Under Secretary of Defense (Acquisition and Technology), to the Director of Operational Test and Evaluation (DOT&E) in FY 1995.

The primary objective of LFT&E is to assure that the vulnerability and survivability of DoD crew-carrying weapons platforms and the lethality of our conventional munitions are known and acceptable before entering full-rate production. LFT&E encompasses realistic tests involving actual U.S. and threat hardware or, if not available, acceptable surrogate threat hardware. The objective is to identify and correct design deficiencies early in the development process, and is required to be completed before weapons programs proceed beyond low-rate initial production. It also includes realistic modeling and simulation, to include pretest predictions, to assure the maximum benefit from the testing. The LFT&E program is essential, especially in view of the escalating costs of technologically sophisticated weapons systems.

The LFT&E program element also supports the DoD's Joint Live Fire (JLF) Program which began in 1984 under an OSD charter to test fielded front-line U.S. and threat combat aircraft and armor systems for their vulnerabilities and fielded weapons, both U.S. and threat, for their lethalties against their respective targets. The Congress, seeing the vulnerability and lethality issues raised by the JLF program, decided that there must be legislation to require that this realistic testing be done on new systems before they reach the field. Hence the Live Fire Test Legislation, Title X, Section 2366 was passed in 1987.

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In the FY 1997 DoD Appropriations Act, the Congress appropriated an initial \$3.0M for the Live Fire Testing and Training (LFT&T) program, formalizing an important LFT&E program relationship. The funding strengthens the natural relationship between live fire test activities and the models and simulations being developed to support the Services' testing and training activities. The LFT&T program is directed by a Senior Advisory Group consisting of DOT&E's Deputy Director for Live Fire Test (Chair) and the four Military Service leaders for training technology located in Orlando, Florida. In FY 1998, the Congress appropriated \$4.0M for continuation and expansion of the program. Again, in FY 1999, the Congress appropriated \$5.0M for further continuation and expansion of the program. Once more, in FY 2000, the Congress appropriated \$7.0M for continuation and expansion of the program. For FY 2001, the Congress added \$7.5M to the LFT&E PE to continue and expand the Live Fire Test and Training Program, specifying that \$1.5M be dedicated to the Augmented Reality for Firefighting initiative started in FY97, and took \$0.120M in reductions for the Section 8086 0.7% across the board appropriation reduction.

The LFT&E program element also funds other activities used to support the functions of the LFT&E, JLF, and LFT&T programs. The other activities, outlined below, are "Crew Casualty Assessment," "Exploring New Technologies/Advanced Concepts and Survivability Initiatives," and "Assuring Modeling and Simulation Adequacy." Efforts in those categories have undergone significant changes during FY 2000, as emphasis is growing on modeling and simulation in support of LFT&E.

LFT&E funding is part of management oversight over research, development, test, and evaluation (RDT&E) of new systems, as well as RDT&E of fielded systems, and therefore budgeted in Program Element Research Category 6.5.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 2000 Accomplishments:

Reviewed and Monitored Major T&E Programs: Completed LFT&E technical assessments for those systems approaching due dates for LFT&E reporting to Congress such as Joint Stand-Off Weapon (JSOW) (BLU-97 warhead), Stand-Off Land-Attack Missile-Expanded Response (SLAM-ER), B-1B Lancer Conventional Mission Upgrade Program (CMUP), B-2 Spirit, MH-47E and MH-60K Special Operations Aircraft, Rolling Airframe Missile (RAM), Command and Control Vehicle, and SH-60B Light Airborne Multi-Purpose System (LAMPS). Oversight of continuing efforts in FY 2000 will include: the Advanced Amphibious Assault Vehicle, the Crusader field artillery system, the M1-based Grizzly Breacher, the Light Tactical Vehicle, the M1A2 Upgrade, the M2A3 Bradley FVS upgrade, the M1-based Wolverine Heavy Assault Bridge (HAB), the Cobra AH-1W Upgrade, the Longbow HELLFIRE, M829E3 120mm Armor-Piercing Fin-Stabilized Discarding Sabot-Tracer (APFSDS-T) ammunition, the Multiple Launch Rocket System (MLRS) (Guided), the High Mobility Rocket System (HIMARS), the Stinger Reprogrammable Microprocessor (RMP) missile, XM1001 Cartridges, the Mk48 Advanced Capability (ADCAP) torpedo, the JDAM weapon, the Medium Extended Air Defense System (MEADS), Navy Theater Wide missile defense, the UH-1N Upgrade, the B-1B Lancer Conventional Munitions Upgrade Program (CMUP), the F-22 Raptor, the F/A-18E/F Super Hornet, the Joint Strike Fighter, the OH-58D Kiowa Warrior, the RAH-66 Comanche, the V-22 Osprey, the CVN(X) aircraft carrier, the SSN-774 (Virginia Class) attack submarine, the SSN-21 (Seawolf)

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submarine, the DDG-51 guided missile destroyer, the LPD-17 transport ship, the ATACMS Block II (BAT), the Follow-on-to-TOW (FOTT), the Javelin Alternate Main Charge Warhead (AMCW) system, the Joint Air to Surface Stand-off Missile (JASSM), the Joint Standoff Weapon (JSOW) (BLU-108 and Unitary warheads), the Objective Crew Served Weapon (OCSW), the Objective Individual Combat Weapon (OICW), Sense and Destroy Armor Munition (SADARM), the Sensor Fuzed Weapon (SFW), the Advanced Medium Air-to-Air Missile (AMRAAM), the AIM-9X Sidewinder missile, the Evolved Sea Sparrow Missile (ESSM), the Navy Area Tactical Ballistic Missile Defense System, Patriot Advanced Capability (PAC-3), Theater High Altitude Area Defense (THAAD), the Airborne Laser (ABL) system, the Medium Extended Air Defense (MEADS) System, and the National Missile Defense (NMD) System.

Managed Joint Live Fire Programs: The first phase of the JLF fuel filler (metal mesh) using generic fuel tanks tests was completed and Phase II testing was started utilizing AH-1S fuel tanks using the same 5 contractor products. Planning for the JLF C-130 wing hydrodynamic ram testing and the test firings were completed. Phase I (static tests) of the CH-47D rotor blade vulnerability program as well as planning of the next phase (quasi-static tests) were completed. JLF sponsored a MANPADS Threat Characterization Workshop that successfully brought together the test & evaluation, modeling & simulation, design, and requirements communities for the first time to work this important issue. In addition to recommending a follow-on discussion, this workshop confirmed the value of the JLF MANPADS tests completed in the past and helped to better plan future tests. JLF also investigated the vulnerability of the F-14 by conducting MANPADS and external fuel tank tests. The external fuel tanks tests were done using both a fuel tank simulator and an actual external fuel tank. A foreign MANPADS threat was also fired at the F-16 using shotlines from Operation Desert Storm. The JLF F-16 program will determine its vulnerability to foreign MANPADS threats by identifying kill mechanisms and their effect on flight performance. The principle objectives are to: 1) obtain a physical understanding of the kinetic energy kill mechanisms and its relative contribution to a kill, 2) identify vulnerable areas and potential vulnerability reduction measures, and 3) collect test data for use in vulnerability analyses and model accreditation. A study of the PGU-28 20mm projectile was also completed, which recommended future JLF testing. JLF lethality tests of U.S. weapons against a SCUD missile launcher was started and tests against two foreign ground vehicles continued. Planning for Phase III of the fuel filler (metal mesh) against fuel tanks found in a wheeled-ground vehicle and a classified foreign vehicle were completed.

Crew Casualty Assessment: Continued the evaluation of aircraft mishaps due to contribution of gravity-induced loss of consciousness (G-LOC). Conducted a Ground Collision Avoidance System (GCAS) G-LOC flight demonstration with Air Force Combat Command operational pilots.

Exploring New Technologies/Advanced Concepts and Survivability Initiative: Completed sponsor testing program of contractor supplied passive ullage protective systems.

Assuring Modeling & Simulation Adequacy: Under the Safety and Survivability of Aircraft Initiative (SSAI) program, continued to address dry bay fire modeling and incorporate the explosive modeling techniques developed at the National Labs under the TWA Flight 800 effort. Continued hypervelocity impact work to identify and document the applicability of hydrocodes and engineering analysis tools to the problem of assessing intercept lethality. The physics-based modeling initiative will evolve and expand to incorporate elements of other DoD M&S efforts. Working meetings were arranged to coordinate R&D, DoD High Performance Computing (HPC), technical support from DOE and Service labs, and

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acquisition decision needs from developmental testing through operational testing, including LFT&E. Initiated an update of the Target Interaction, Lethality, and Vulnerability (TILV) Master Plan to support Directed Energy Weapons.

Live Fire Testing and Training: Completed the Effectiveness of Small Arms Fire project started under the FY 1997 program. Completed the Battle Damage Assessment and Repair, Realistic Munitions Impact Flash Events, and Augmented Reality for Total Ship Survivability Test projects started under the FY 1998 program. Completed the Enhance Recovery/Training of Aircrew, the LFT&E Training Opportunities for Battle Damage Assessment, and Non-ballistic Live Fire Test and Training Laser Threats projects started under the FY 1999 program. Completed solicitation, evaluation, and selection process to identify FY 2001 new start projects. The five new projects are Weapons Aim Point Analysis and Training Tool, Results of JLF MANPADS Testing for Training, Almost Loss of Consciousness (ALOC) on Aircrew Performance, Moving Weapons Platform Simulator, and Virtual Target Gunnery System.

Radio Frequency (RF) Weapons Vulnerability Assessment: Continued the assessment of the requirements for testing of the vulnerability of U.S. military systems to asymmetric threats. Initiated vulnerability testing and evaluation of the threat of RF devices (characteristic of what a rogue nation or terrorist could fabricate using only “open source” information and available hardware components) on modern and future military systems, support infrastructure, and systems under development using commercial off-the-shelf technology, which could or will have military application. These systems were evaluated with regard to their vulnerability, susceptibility, and survivability to degradation, disruption, upset, and damage from the RF devices. The testing was conducted in realistic environments where such RF devices would be used.

Official Travel and Administrative Support: Performed official travel and procured administrative support to carry out oversight of Live Fire Test and Evaluation programs as well as fund efforts of common interest with the Director, Operational Test and Evaluation.

FY 2001 Plans:

Review and Monitor Major T&E Programs: Complete LFT&E technical assessments for those systems approaching due dates for LFT&E reporting to Congress. Oversight of continuing vulnerability efforts in the category of armored vehicles will include: the Advanced Amphibious Assault Vehicle, the M1A2 Abrams Tank Upgrade, the Command and Control Vehicle (C2V), the Crusader field artillery system, the M1-based Grizzly Breacher, the M1-based Wolverine Heavy Assault Bridge (HAB), the M2A3 Bradley FVS upgrade, the family of Interim Armored Vehicles (IAV), the Line-of-Sight Anti-Tank (LOSAT), and the High Mobility Rocket System (HIMARS). Under the category of ships and submarines, efforts will continue on the DDG-51 guided missile destroyer, the Seawolf (SSN-21) submarine, the USS Jimmy Carter (SSN-23), the LPD-17 transport ship, the T-ADC(X) Auxiliary Dry Cargo Ship, the CVN(X) aircraft carrier, the DD 21 Land Attack Destroyer, the Virginia Class (SSN-774) attack submarine, the Joint Command and Control ship (JCC(X)), and the replacement amphibious assault ship LHA(R). Under aircraft, vulnerability oversight will continue on the OH-58D Kiowa Warrior, the RAH-66 Comanche, the F-22 Raptor, the V-22 Osprey, the MH-47E and MH-60K Special Operations Aircraft (SOA), the F/A-18E/F Super Hornet, the B-2 Spirit, C-130 AMP, the C-130J, the Joint Strike Fighter, the UH-60L+ Blackhawk, the CH-47F Improved Cargo Helicopter, the AH-1W Helicopter Upgrade, the UH-1N Upgrade, the CH-60S, SH-60R, the CH-60 Combat Search and Rescue (CSAR), the CH-60 OAMCM, the KC-130J, the C-5 REPR, the C-17A Upgrade, the B-1B

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Lancer Conventional Mission Upgrade Program (CMUP), and the Airborne Laser (ABL) system. Oversight of lethality efforts in the category of ground attack weapons will include the Javelin Alternate Main Charge Warhead (AMCW) system, the ATACMS Block II (BAT), the Sense and Destroy Armor Munition (SADARM), the Tactical Tomahawk, the Joint Air to Surface Stand-off Missile (JASSM), the Sensor Fuzed Weapon (SFW), the Objective Crew Served Weapon (OCSW), the Objective Individual Combat Weapon (OICW), M829E3 120mm APFSDS-T ammunition, the Multiple Launch Rocket System (MLRS) (Guided), the Joint Standoff Weapon (JSOW) (Unitary warhead), the XM96 Lightweight Fragmentation Hand Grenade, the TOW Fire and Forget, the LOSAT missile, and the Wide Area Munition (WAM) PI. Oversight of lethality of air and missile defense systems will include the Patriot Advanced Capability (PAC-3), the Medium Extended Air Defense System (MEADS), Theater High Altitude Area Defense (THAAD), the Advanced Medium Air-to-Air Missile (AMRAAM), the AIM-9X Sidewinder missile upgrade, the Standard Missile Block IVA, the Evolved Sea Sparrow Missile (ESSM), the Navy Area Tactical Ballistic Missile Defense System, the Rolling Airframe Missile (RAM) HAS, the National Missile Defense (NMD) System, the Stinger-Reprogrammable MicroProcessor (RMP) missile, Navy Theater Wide missile defense, and the Airborne Laser (ABL) system.

Manage Joint Live Fire Programs: Conduct tests of fielded systems not previously tested under Air, Land, or Sea Joint Live Fire programs. JLF expects to plan and execute a lethality test of a helicopter-launched Hellfire missile against a small-ship target. Lethality testing of U.S. weapons against a SCUD missile should begin. We expect to start lethality tests against an additional foreign target vehicle, continue testing of a second vehicle started in FY 2001, and complete testing of the third classified vehicle started in FY 1999. Phase II of the fuel filler (metal mesh) testing and a C-130 mission abort study will be completed. Vulnerability testing of F-14 and F-16 aircraft will continue addressing different subsystems, issues, and possibly threat munitions. JLF will explore the availability and need for F-117 vulnerability testing. The final JLF tests of the CH-47D rotor blades will be started by firing at dynamic, loaded rotor blades on an operating helicopter. Advanced planning and feasibility studies will be completed for potential future projects, such as EA-6B composite wing, fire suppression for the C-130 wing leading edge, AH-1 tail rotor blade static, anti-helicopter mine threat, engine vulnerability, and damage digitization equipment development. JLF will sponsor another MANPADS Threat Characterization Workshop as a follow-on to the FY 2000 meeting. The analysis of the C-130 wing hydrodynamic ram test data will be completed. Lethality testing of the PGU-28 20mm projectile against the MiG-29 aircraft is also planned. JLF will look to acquire foreign targets and munitions, invest in development of technologies that increase test realism, and improve data base management tools.

Crew Casualty Assessment: Complete the effort toward investigating the issues and potential user casualty risks associated with the operational impact of acceleration-induced incapacitation, along with G-LOC, caused by highly dynamic aircraft flight. Begin to evaluate potential mitigation techniques to decrease incapacitation and improve training for resistance to acceleration induced incapacitation. Conduct a Ground Collision Avoidance System (GCAS) G-LOC flight demonstration with Air Force Combat Command operational pilots.

Exploring New Technologies/Advanced Concepts and Survivability Initiative: Continue to sponsor testing of contractor-supplied passive ullage protective systems. Test results will be reported and supplied to participating contractors as well as the services and major airframe manufacturers.

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Physics Based Evaluations: Continue strong emphasis on understanding the application of physics-based modeling and simulations to test programs and the evaluation of their adequacy. Generate resources for continuing SSAI and provide seed funding for other efforts stemming from the LFT&E physics-based modeling workshops. Assure that programmatic focus is maintained in the development and application of M&S tools and that training capabilities are continuously improved to reflect more credible models. Push for a more consistent infrastructure for managing the M&S that supports T&E specifically and the acquisition process in general. In an environment of shrinking resources it is essential to understand the marginal return on M&S investment. Complete an update to and release of the Target Interaction, Lethality, and Vulnerability (TILV) Master Plan to support Directed Energy Weapons.

Live Fire Testing and Training: Continue projects started in prior years and start new projects to the extent funding allows. Begin dedicated project in Augmented Reality based firefighting.

Radio Frequency (RF) Weapons Vulnerability Assessment: Continue the testing of the vulnerability and survivability of U.S. military systems and commercial off-the-shelf (COTS) technologies to potential asymmetric RF devices of differing wavelengths. Expand the test and evaluation program to encompass more military weapon systems, new COTS technologies, and other directed energy threats.

Official Travel and Administrative Support: Perform official travel and procure administrative support to carry out oversight of Live Fire Test and Evaluation programs as well as fund efforts of common interest with the Director, Operational Test and Evaluation.

FY 2002 Plans:

Review and Monitor Major T&E Programs: Complete LFT&E technical assessments for those systems approaching due dates for reporting to Congress. Oversight of vulnerability efforts in FY 2002 are expected to include the Advanced Amphibious Assault Vehicle, the M1A2 Abrams Tank Upgrade, the Command and Control Vehicle (C2V), the Crusader field artillery system, the M1-based Grizzly Breacher, the M1-based Wolverine Heavy Assault Bridge (HAB), the M2A3 Bradley FVS upgrade, the family of Interim Armored Vehicles (IAV), the Line-of-Sight Anti-Tank (LOSAT), and the High Mobility Rocket System (HIMARS). Under the category of ships and submarines, efforts will continue on the DDG-51 guided missile destroyer, the Seawolf (SSN-21) submarine, the USS Jimmy Carter (SSN-23), the LPD-17 transport ship, the T-ADC(X) Auxiliary Dry Cargo Ship, the CVN(X) aircraft carrier, the DD 21 Land Attack Destroyer, the Virginia Class (SSN-774) attack submarine, the Joint Command and Control ship (JCC(X)), and the replacement amphibious assault ship LHA(R). Under aircraft, vulnerability oversight will continue on the OH-58D Kiowa Warrior, the RAH-66 Comanche, the F-22 Raptor, the V-22 Osprey, the MH-47E and MH-60K Special Operations Aircraft (SOA), the F/A-18E/F Super Hornet, the B-2 Spirit, C-130 AMP, the C-130J, the Joint Strike Fighter, the UH-60L+ Blackhawk, the CH-47F Improved Cargo Helicopter, the AH-1W Helicopter Upgrade, the UH-1N Upgrade, the CH-60S, SH-60R, the CH-60 Combat Search and Rescue (CSAR), the CH-60 OAMCM, the KC-130J, the C-5 REPR, the C-17A Upgrade, the B-1B Lancer Conventional Mission Upgrade Program (CMUP), and the Airborne Laser (ABL) system. Oversight of lethality efforts in the category of ground attack weapons will include the Javelin Alternate Main Charge Warhead (AMCW) system, the ATACMS Block II (BAT), the Sense and Destroy

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Armor Munition (SADARM), the Tactical Tomahawk, the Joint Air to Surface Stand-off Missile (JASSM), the Sensor Fuzed Weapon (SFW), the Objective Crew Served Weapon (OCSW), the Objective Individual Combat Weapon (OICW), M829E3 120mm APFSDS-T ammunition, the Multiple Launch Rocket System (MLRS) (Guided), the Joint Standoff Weapon (JSOW) (Unitary warhead), the XM96 Lightweight Fragmentation Hand Grenade, the TOW Fire and Forget, the LOSAT missile, and the Wide Area Munition (WAM) PI. Oversight of lethality of air and missile defense systems will include the Patriot Advanced Capability (PAC-3), the Medium Extended Air Defense System (MEADS), Theater High Altitude Area Defense (THAAD), the Advanced Medium Air-to-Air Missile (AMRAAM), the AIM-9X Sidewinder missile upgrade, the Standard Missile Block IVA, the Evolved Sea Sparrow Missile (ESSM), the Navy Area Tactical Ballistic Missile Defense System, the Rolling Airframe Missile (RAM) HAS, the National Missile Defense (NMD) System, the Stinger-Reprogrammable MicroProcessor (RMP) missile, Navy Theater Wide missile defense, and the Airborne Laser (ABL) system.

Manage Joint Live Fire Programs: Conduct tests of fielded systems not previously tested under Air, Land, or Sea Joint Live Fire programs. Tests of foreign systems acquired for exploitation will continue. Additional U.S. munitions will be tested against the SCUD launcher. Testing of U.S. munitions against the remaining two classified targets should be completed. Plans for JLF tests to investigate the lethality of U.S. munitions against foreign air defense systems will be also be finalized. JLF testing of the CH-47D rotor blades will be completed and lethality testing of U.S. weapons against the MiG-29, Hind, and additional air defense systems has been proposed. Additional aircraft vulnerability tests of the F-14 and F-16 are being considered as well as tests of the AH-64, F-117, AH-1S, CH-53E, and OH-58C/D. JLF will continue to acquire foreign targets and munitions, invest in development of technologies that increase test realism, and improve data base management tools.

Crew Casualty Assessment: Continue to promote and evaluate crew casualty technologies and initiatives to the extent that funding allows. Emphasis will be on human/crew performance and survivability.

Exploring New Technologies/Advanced Concepts and Survivability Initiative: Continue to promote and evaluate new technologies in support of safety and survivability of aircraft, focusing on fire and explosion effects and mitigation.

Physics Based Evaluations: Emphasis will continue in the area of physics based modeling and simulation and its close connection to realistic assessment and training. Continue development of consistent approaches to risk evaluation and T&E prioritization based on modeling.

Live Fire Testing and Training: Continue projects started in prior years and start new projects to the extent funding allows. Continue dedicated project in Augmented Reality based firefighting for transition to fleet use to the extent funding allows.

Radio Frequency (RF) Weapons Vulnerability Assessment: Continue the testing of the vulnerability and survivability of U.S. military systems and commercial off-the-shelf (COTS) technologies to potential asymmetric RF devices of differing wavelengths to the extent funding permits from within LFT&E core funding. Expand the test and evaluation program to encompass more military weapon systems, new COTS technologies, and other directed energy threats.

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General DOT&E Support: Continue the design and development of a Knowledge Management System , adding robust functionality to enable rapid decision-making on time critical events. The system will be extended to the majority of the DOT&E enterprise and will include Live Fire Test and Evaluation templates, guidelines and best practices for DOD personnel. This effort will fully support the Department's goal and vision.

Official Travel and Administrative Support: Perform official travel and procure administrative support to carry out oversight of Live Fire Test and Evaluation programs as well as fund efforts of common interest with the Director, Operational Test and Evaluation.

B. (U) PROGRAM CHANGE SUMMARY

(\$ in Millions)	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>
FY 2001 President's Budget	16.669	9.712	9.887
Live Fire Testing		6.000	
Reality Fire-Fighting Training		1.500	
Section 8086 Reduction		(.120)	
P.L. 106-554 Reduction		(.038)	
Appropriated Value	16.669	17.054	
Adjustments to Appropriated Value			
Current Budget Submit	16.669	17.054	9.887

C. (U) OTHER PROGRAM FUNDING NA