S-520/S-620 Assessment Team

Strategic Assessment

S-520 & S-620 Training Programs

Report to:

USDA Forest Service
National Advanced Fire and Resource Institute
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Assessment Team Members

Paul Broyles, Team Leader
DOI National Park Service
National Fire Operations Program Leader
National Interagency Fire Center
3833 S. Development Ave.
Boise, ID 83705 (208) 387-5226
email: Paul_Broyles@nps.gov

Scott Vail, USDA Forest Service, Eldorado NF
Forest Fire Management Officer
100 Forni Road
Placerville, CA 95667 (530) 621-5225
email: svail@fs.fed.us

Jim Boynton, USDA Forest Service, Okanogan & Wenatchee NF
Forest Supervisor,
215 Melody Lane
Wenatchee, WA 98801 (509) 664-9323
email: jboynton@fs.fed.us

Don Studebaker, DS Incident Management Training
President
4739 55th St.
San Diego, CA 92115 (619) 582-3598
email: dstudebake@aol.com

Greg Greenhoe, Sagacity Wildfire Services
Associate Consultant
P.O. Box 7391
Missoula, MT 59807 (406) 546-5425
email: Greenhoe@bresnan.net

Lark McDonald, Mission-Centered Solutions
President
P.O. Box 969
Franktown, CO 80116 (303) 646-3700
email: LMcDonald@MCSolutions.com

Kevin Monk, Department of Sustainability & Environment
Government of Victoria
Manager Fire Training
4/8 Nicholson Street,
East Melbourne 3002
Victoria, Australia +61 (3) 9412 4765
email: Kevin.Monk@dse.vic.gov.au

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Executive Summary

Originally tasked to review S-520 and S-620, the Assessment Team broadened the scope of the evaluation to strategically look at the mid and advanced levels of the NWCG incident management curriculum, addressing multiple issues and concerns raised in this and earlier assessments.

Key recommendations include:

- Redistributing, revising and completing the incident management curriculum to "push" formal learning earlier in the curriculum and in an employee's incident management career.
- Adopt new learning models for conducting simulation and distance learning to reduce cost and resource drains.
- Establishing formal assessment "gateways" at 300, 400, 500 and 600 levels.
- Establishing a "College of Command and Staff" within a "University of Fire Management".

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I. Introduction

Tasking of Assessment Team

In late 2004, the Director of the National Advanced Fire & Resource Institute (NAFRI), initiated a series of evaluations and assessments of the curriculum at NAFRI, starting with the top level national training at NAFRI, S-520 Advanced Incident Management and S-620 Area Command.

The objectives given the Assessment Team by the Director were to ensure that:

1. Agency needs are being met and course content supports the agencies' missions and goals and is compliant with existing policies.
2. Student needs are being met in regards to course content and learning value.
3. Course is relevant to how the work is actually being performed in the field.
4. Advancement of learning and use of adult education principles are being used.
5. Use of new technology and advances in simulation are being incorporated into the course of work.
6. Course linkages with other existing National Wildland Coordinating Group (NWCG) course work are made.

See Appendix A for the Team's initial assessments on the original objectives.

In the inbriefing with Forest Service Fire Director Tom Harbour and acting NAFRI Director Bob Cunningham, Harbour requested that the Team not limit itself to a simple review of the two courses, but rather look strategically in terms of the program's role in the larger curriculum, whether the current methods of course delivery and development were adequate, and what more sustainable and viable approaches might be employed in light of the new missions posed to the wildland fire incident command organization in the pending implementation of the National Incident Management Organization (NIMO). While the course evaluation goal was not completely abandoned by the team, it was augmented significantly to focus on the program in the context of a future 5-7 year time horizon. This shift to a more strategic approach was subsequently approved by Cunningham and Harbour and was felt that examining the strategic positioning of not only S-520 and S-620 was appropriate, but that the examinations should not be isolated to these programs and include consideration down to the 300 level.

Supporting this redirection is the fact that individual assessments of the content and execution of S-520 and S-620 are conducted routinely by the respective steering committees, and another evaluation of the course from an outside group would yield less overall benefit to the organization.

This report details how S-520 and S-620 fit within the curriculum that supports incident management. Most of the problems are well understood and reported widely. Some have been reported in earlier assessments, but overall the Team believes that these problem sets are now more evident due to the challenges faced by Incident Management Teams (IMTs), particularly in the aftermath of 9/11.

It is important to note that in general terms the S-520 and S-620 programs are effective, if not necessarily efficient, programs. The faculty is highly skilled. The presentations observed by the team were uniformly superior to most fire training instruction in the system. The people supporting and guiding these programs are dedicated and exceptional. The steering committees have been successful in improving the level of student preparation and introducing mentoring in these programs. The members of the committee should be complimented for their recent notable successes in the last two course iterations, in making beneficial modifications that have collectively resulted in a reduction in failure rates from 25% to approximately 8%.

The problems and solutions suggested in this assessment are rooted in programmatic and organizational factors that transcend the current system. The inadequacies are systemic and brought on by a system that has not been fully adapted to the demands of the all-risk environment.

Methodology

The Assessment Team began the process by reviewing the original scoping as defined under the statement of work to assure that the effort was appropriate and properly focused. After an inbriefing by Tom Harbour and Bob Cunningham, the Team constructed a revised approach, focused on a strategic response to changes in incident management and requisite training. Problems with cost and applicability were identified as points that should be reviewed. The team validated their understanding of strategic intent with both Harbour and Cunningham, as well as Steering Committee Chair Edy Williams-Rhodes.

Upon completion of the scoping and problem definition, which included a review of all background materials and studies/reports (see Appendix B), a desired future state was constructed that would potentially address most of the problems identified during the scoping process. With this "vision" in mind, the team conducted interviews to gather additional issues and perspectives on the conduct of the S-520 and S-620 programs. The team interviewed all steering committee members, various faculty, including coaches, evaluators and simulation personnel, and numerous students.

Subsequent personal observations of classroom presentations and simulations (with attention to evaluation methods and methodologies), were conducted.

The team then developed conclusions and draft recommendations, which were then validated against the collected interviews and observations. A final draft was subsequently completed.

II. Problems and Issues

The assessment team has identified several issues and problems with the current training and evaluation system that brings personnel into service with incident management teams.

Cost

The S-520 and S-620 program is estimated to be the most expensive of NWCG programs by several orders of magnitude. The cost/benefit ratio has been questioned for years and the issue has been studied on at least two prior occasions.

The costs of training come in many forms, and include travel, facilities, materials, and salaries for students, instructors, and development and support personnel. The program requires approximately 132 instructors, coaches, and staff, which support 96 students, yielding a faculty and support staff ratio of 1.4 to 1. Prior studies have estimated the per-session cost at more than $1M per session (see Appendix B for further data).

Although the per-student cost of the S-520 "event" is high ($10-12K/student), the question of value is probably more at the heart of this issue.

Logistical Resource Requirements

Logistical needs of the S-520 course are extremely complex. For example, the programs require 10 classrooms of varying sizes, 12 team rooms, and 12 simulation rooms, many at the same time. Other needs include 39 phones, 30 radios with 12 frequencies; 6 copy machines, and 12 fax boxes; 12 NAFRI support staff; 62 faculty, coaches and functional experts; 20 support players, and 38 simulation team members. Course materials for the 2005 sessions included 186 binders of different sizes and 300 CDs (see Appendix C).

A biennial event, the course is also attended by many visitors, observers, and evaluators that require additional logistical personnel or support. The 2005 session was to be attended by members of Fire Department New York and international observers.

Beyond the direct and support costs mentioned above, the program's faculty is comprised of high level fire management personnel, including Geographic Area Coordination Center (GACC) coordinators, agency administrators, several regional and state fire directors, and national agency directors, many of whom are dedicated to the effort for the course's two weeks. Faculty-intensive courses of this type place significant demands on agency missions and individuals' demanding schedules.

Impacts to State and Local Cooperators

The time and financial commitment of a two week program has proven problematic for state and local personnel who want to serve on national incident management teams. As a result, the one-week Complex Incident Management Course (CIMC) has been developed as an alternative to S-520 to certify state Type I teams and personnel.

Lack of Systems Maturity in Training Development Processes

The history of S-520 is rooted (as with many other NWCG programs) in the work of collateral-duty subject matter experts, working in assembled committees, to guide and develop the course. These previous S-520 committees have typically had little time to consider the content of adjacent learning programs, and it has been a struggle to adapt as needed to the changing needs of the students or the mission. Many of the objectives have been passed down through the years inside the content, but most of these objectives have not been independently identified or validated. As a result, this implied knowledge of intent and design has been passed down from committee member to committee member over a span of many years. This program, like others in NWCG, does not contain detailed learning objectives which link to specific content and performance measurements. The program was not developed using any industry standard Instructional Systems Design methodologies (e.g., Dick & Carey Model, ADDIE Model, Kemp Model, ICARE Model, ASSURE Model, etc.), which have been widely used by corporate industry, the military, and other government agencies since the early 1980s.

This condition is not a reflection of a lack of effort from the personnel or committees who have been working on this program; it is a reflection of a lack of systemic maturity and focus. More recently, the "symptoms" that this maturation has not occurred fast enough are becoming increasingly evident and are present in the S-520 program. These symptoms include two issues identified previous to this study: the linkage of the S-520 program with other NWCG Incident Management courses, and the confusion concerning whether the program is training or a test.

Symptom: Poor Linkage with other NWCG Incident Management Courses

The lack of common vision and training management over the connection of incident management training courses has been an ongoing topic of discussion in NWCG training circles, and remains unresolved. Specifically, there has been an historic disconnect between courses within the wildland fire incident management curriculum. Advanced Incident Management S-520 and Area Command S-620 likely evolved from a course titled National Command School in 1961 at the Forest Service's Continental Divide Training Center, with the courses not changing basic format since the middle 1970s at the National Advanced Resource Technology Center. The remainder of the incident management curriculum (100 through 400 levels) has been developed separately at the Boise Interagency Fire Center/National Interagency Fire Center (NIFC), starting in the early 1990s (current NWCG curriculum). Neither center's curriculum development group has been given direction to bridge the knowledge nor the skill set between the two. Much of the content in S-520 was developed at an earlier time and independent of S-420 and other NWCG courses, and as a result S-520 is not well linked to these courses. A similar disconnect is emerging in the Leadership (L) curriculum, with NIFC and NAFRI dividing upper and lower level courses.

Beyond the curriculum bottom-to-top disconnection, the Leadership (L) and Skills (S) curricula have yet to be linked to each other above the 300 level. S-420 and S-520 both contain leadership, teambuilding, and communication components, but they remain disconnected from the emerging leadership programs.

This situation has contributed to problems of inefficiency, redundancy, and disconnections in the learning experience of students progressing through the system into higher levels of incident management responsibilities. This lack of coordination also complicates the revision and update process of existing courses, and the design and development of new programs such as L-480.

In an effort to demonstrate how course content might be redistributed, the Assessment Team conducted a quick evaluation on the existing content in S-520 and S-620, with an eye on determining what subjects could be or should be taught at an earlier point. This quick analysis is located in Appendix E and should not be considered a high level design for a future curriculum.

Symptom: Confusion about Training vs. Testing

Interviews and observations indicate considerable confusion about whether the purpose of the S-520 and S-620 courses is to test competencies or to train new skills. Some said that it was both and should remain both testing and training.

Although sometimes thought as "field expedient," combining testing and training activities into the same process and activities requires a clear understanding of what is tested, how it is linked to the content, where the test occurs in the process, and how it is administered. The student must understand these factors as well. In the case of S-520, most students and cadre could not identify these factors in a manner that clearly delineated the training and testing environments. Some students reported that the stress of preparing for the simulation interfered with the formal training materials and that the classes before the simulations were a waste because their attention was on passing the test.

While there is no doubt that people learn from the testing process itself, it is never considered the most efficient or effective manner of building competency. In industries where student certification is important and must be defendable in a court of law, there is very clear delineation between "training" and "testing." In many cases, these certifications are issued by entirely different entities than their training counterparts to assure that the standards are met. Certifications for CPAs, lawyers, pilots, and doctors are all handled in separate testing events, conducted by trained and approved personnel using standardized tools and measurements.

Generally many members of the cadre felt that the purpose of the "school" component of the S-520 course was in part to fill any remaining holes in the student's knowledge base prior to the testing because of a lack of standardization in the skill sets of the arriving students. Beyond this, the content of the school was not necessarily seen as information required for the simulation test, but rather it was seen as information required for the job post-certification. Some cadre noted that the S-520 course was the only (or the best) place and time to get this supplemental information.

Generally, the lack of definition between training and testing environments makes the use of the course as a certification device problematic.

Applicability of Course Content to Current IMT Needs

Over the last decade or more, there has been a marked change in the utilization of incident management teams. For example, where once Type II IMTs were primarily staffed and deployed at the local level, they are now managed regionally and are frequently assigned to other geographic areas, and to Type I wildfire and all-risk incidents. With the reduction in numbers of Type II IMTs, and more limited availability, Type III organizations are increasingly being formed and deployed.

The transition to a National Incident Management Organization (NIMO) further exacerbates the need to build skills and competencies at the 300 and 400 levels (see Appendix D).

Many of the traditional Type I skills, competencies, and knowledge is now needed earlier in the career development process, making much of the content presented in the current S-520 too late in the incident management curriculum. In essence, people need access to training, mentoring and experience earlier to extend their IMT service life. A preliminary analysis (Appendix E) indicates that there is little in the existing program that is correctly placed.

Capacity to Meet IMT Staffing Demands

Collectively, there are concerns about the wildland fire system's ability to train and qualify sufficient personnel to meet incident management demands, keeping in mind that it may take two (or more) trained personnel to staff a single IMT position. There are several factors that are contributing to this situation:

- First there is a continuing lack of qualified personnel, especially in Finance, Logistics and Planning. Changes in organizations and centralization of business management and other functions are reducing the number of personnel available for incident management. Managers are less willing to allow employees to participate in incident management.

- Specifically within the Type III Incident Commander ranks, fewer personnel are willing to become qualified in this area due to perceived increases in responsibility and liability. This may translate into Incident Commander shortages in the future.

- Within the ranks of qualified individuals we are losing personnel due to a loss of personal and agency commitment to continue with this collateral duty and concurrently maintain a personal life and a professional career. Especially within smaller organizations there is a reluctance by management to allow personnel to participate on Incident Management Teams.

- Many candidates identified to fill positions for the S-520 course a year in advance dropped out of the process by the year end. Job position changes and changes in the level of commitment from the local unit were cited as the major factors contributing to this attrition.

- Continued policy changes regarding IMT deployment operations (e.g., team size, out of region deployment, and lack of adequate equipment and support, such as IT) have contributed to lowered enthusiasm about IMT service in general. Many Type I and II personnel report that they are beginning to rethink the hassles, disruptions and risks associated with IMT service, and in some cases are limiting their availability for assignment. It is unclear about how many personnel are affected, or how many potential students may not enter the IMT system this year because of these issues and uncertainties.

Longevity of IMT Participation

Over the past ten years the average age of an S-520 course participant has aged nearly a year for every one that passes. At an average age of 48, 2005 session graduates have an average of 7-9 years of potential service before retirement. In the 1980s the average age was in the mid to late 30s, ensuring a 15-20 year window of potential IMT service.

Increased average age of S-520 graduates has two effects: one is in lowering the return on investment (ROI) the organization receives on an IMT candidate, and second, the likelihood that the student will be less available for service during the years they have left due to increased professional commitments elsewhere, as many of these personnel work at mid to high levels of fire management.

Generally, the largest organizational impact of the "age factor" has to do with the available window of potential service. In some cases, bringing personnel to a team at 40 years of age could conceivably double the ROI over the current system.

Slow Advancement through the System

Slow advancement through the fire qualification system is another factor contributing to students coming to S-520 at 45-50 years of age. This is due to students not being able to get required training or the appropriate experience in a timely manner. Budget, logistical and home unit work constraints may limit the number of courses a person can attend in any given year. The same is true for gaining on the job experience, especially in areas where fire activity is low. Employees tend to move more quickly through the qualification system where there is a commitment from the agency to follow a training and development plan, and there is ample opportunities to fire-ground experience.

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III. A Vision for Incident Management Training

In discussions with fire directors and other incident management personnel, the assessment team believes that a strategic picture must emerge which addresses changes stemming from the implementation of NIMO, the National Response Plan (NRP), and the National Incident Management System (NIMS). The assessment team offers the following vision for future fire and all-risk incident management training and development where:

- there is a consistent stream of quality applicants that are trained to the Advanced Incident Command and General Staff level with 10-15 years remaining in their careers.
- professional agency commitment is provided to each employee throughout his/her fire management career.
- employees are committed to service before, during and after training.
- there is a clear distinction between training and evaluation processes, and both are in alignment with operational needs.
- a clear definition of what organizational and management differences exist between local (Type III), geographic, national and NIMO incident management teams.
- any change to Advanced Incident Management and Area Command training is cost effective and reinforces integrity of pre-requisites and curriculum delivery.
- mentoring, training and evaluation is consistently accomplished as students advance through the incident management ranks.

Operations Briefing during S-520 Simulation

IV. Recommendations and a Model for the Future

Recommendations

Redistribute learning

1. ***NWCG clearly define the performance expectations, organizational structure and qualifications for participation on NIMO, Geographic Area (Type I, II), and local Type III incident management teams.*** This must be done to reduce redundancy in training and ensure performance standards and qualifications meet the appropriate fire and all-risk incident requirements.

2. ***NWCG initiates a thorough review to assess and integrate or properly place the content from S-420, S-520, S-620 and L-381, L-480***. These courses would be reviewed to determine if there is any redundant material and distribute content to the appropriate level. The evaluation would need to determine if there are important building blocs of development not present and establish appropriate media for delivery. This effort could be expanded to evaluate the content of other courses in the I and S-series.

3. ***Create an S-320 course to support the testing and evaluation needs of the Type III organization and integrate that course with those in #2 above.***

4. ***NWCG develops different knowledge transfer mechanisms to improve efficiencies and reduce costs to support this curriculum.*** Examples could include seminars, selected meetings (to further the communication of processes and techniques, e.g., IMT, IC/AC, etc.), online, professional reading, and other self-paced methods.

5. ***Establish a clear distinction between training and evaluation processes, and assure that they are in alignment with mission needs.*** This testing and evaluation process should be independent of learning activities and processes. The testing process would encompass established gateways to the next level (S-320, S-420, S-520, S-620)**.** NIMO team members should be used for the S-520 and S-620 evaluation tests, and could be used for S-420 simulations, as well as development of learning modules/curricula for intervening learning enhancement.

6. ***Move 520/620 training content that is applicable to the Type III and Type II operational environments to the 300 and 400 level curriculum.***

Streamline Delivery of Training, Experience and Evaluation

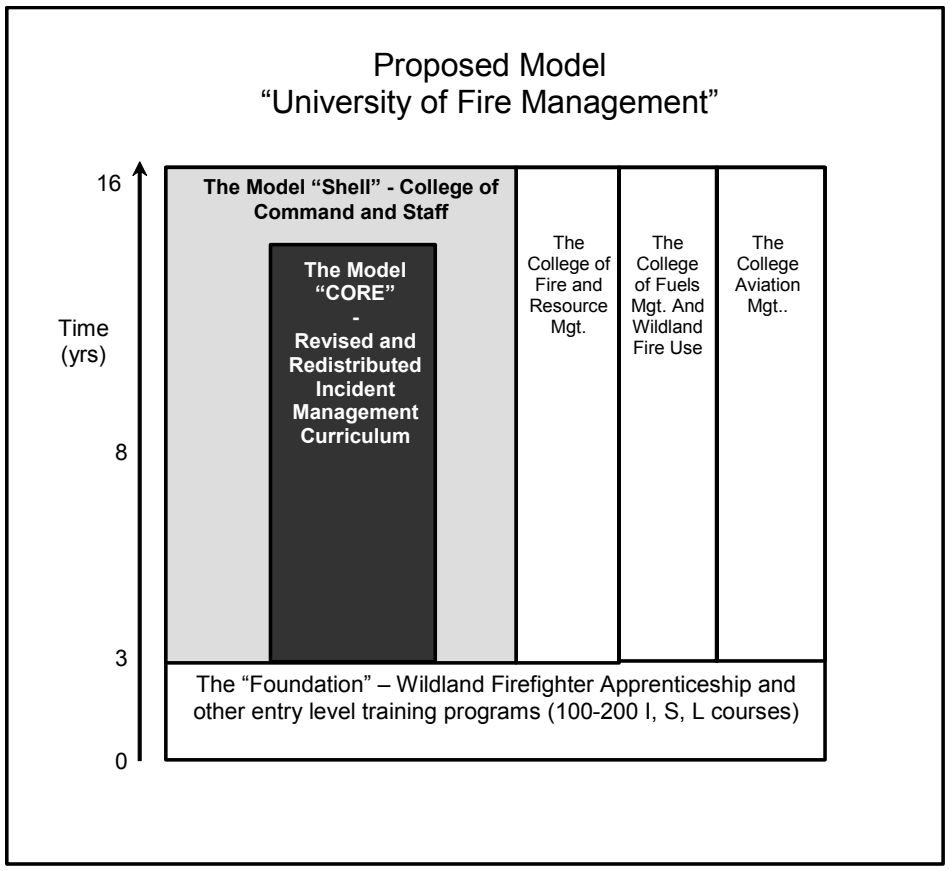
7. ***Develop a College of Command and Staff using NIMO and a virtual "non-brick-and-mortar" structure, using existing facilities, and similar procedures to the Wildland Firefighter Apprenticeship Program.*** This organization will recruit and select candidates, manage training, including a timeline/schedule for training and experience then mentor and coach these individuals as they move up through the qualification system. This may last from 8 to 12 years resulting in a fully trained and competent Type I command and general staff member with 15-20 years of available incident management service.

8. ***Within the College of Command and Staff, develop agency and employee agreements that enter the employee and agency to a professional development and service commitment similar to that used in the Wildland Firefighter Apprenticeship Program.*** Professional, personal and agency commitment are provided to each employee throughout his/her fire management career.

9. ***Within the College of Command and Staff, develop a formal mentoring program that will support ongoing training and evaluation and support the needs of state and local agencies in wildland fire and all-risk operations.***

Proposed Model

This vision includes a model for the future of incident management training that would address the problems and issues described above, and provide a permanent base from which to continue to build and evolve. The model is comprised of two components – a core incident management curriculum and a shell comprised of several colleges within a larger "University of Fire Management". This proposal primarily addresses the development process for incident management training in a "College of Command and Staff".



The existing NWCG incident management curriculum would need to be revised and redistributed first, which would comprise the core of the curriculum. The core addresses the problems associated with lack of curriculum connectivity and the timing of content relative to the need to address the National Response Plan, NIMO, and other emerging issues. It also alleviates the conflict of learning vs. testing strategies, and addresses cooperator concerns about cost, accessibility, the amount of formal training, and information currency regarding federal and national issues.

The shell describes a larger structure that encompasses the core, but is expanded to include other educational support components that address the problems associated with student age, time in training, mentoring, and evaluation. In practicality the core should be implemented in all cases. The shell can be implemented at a slower rate, but could dramatically improve the effectiveness of the training model once implemented.

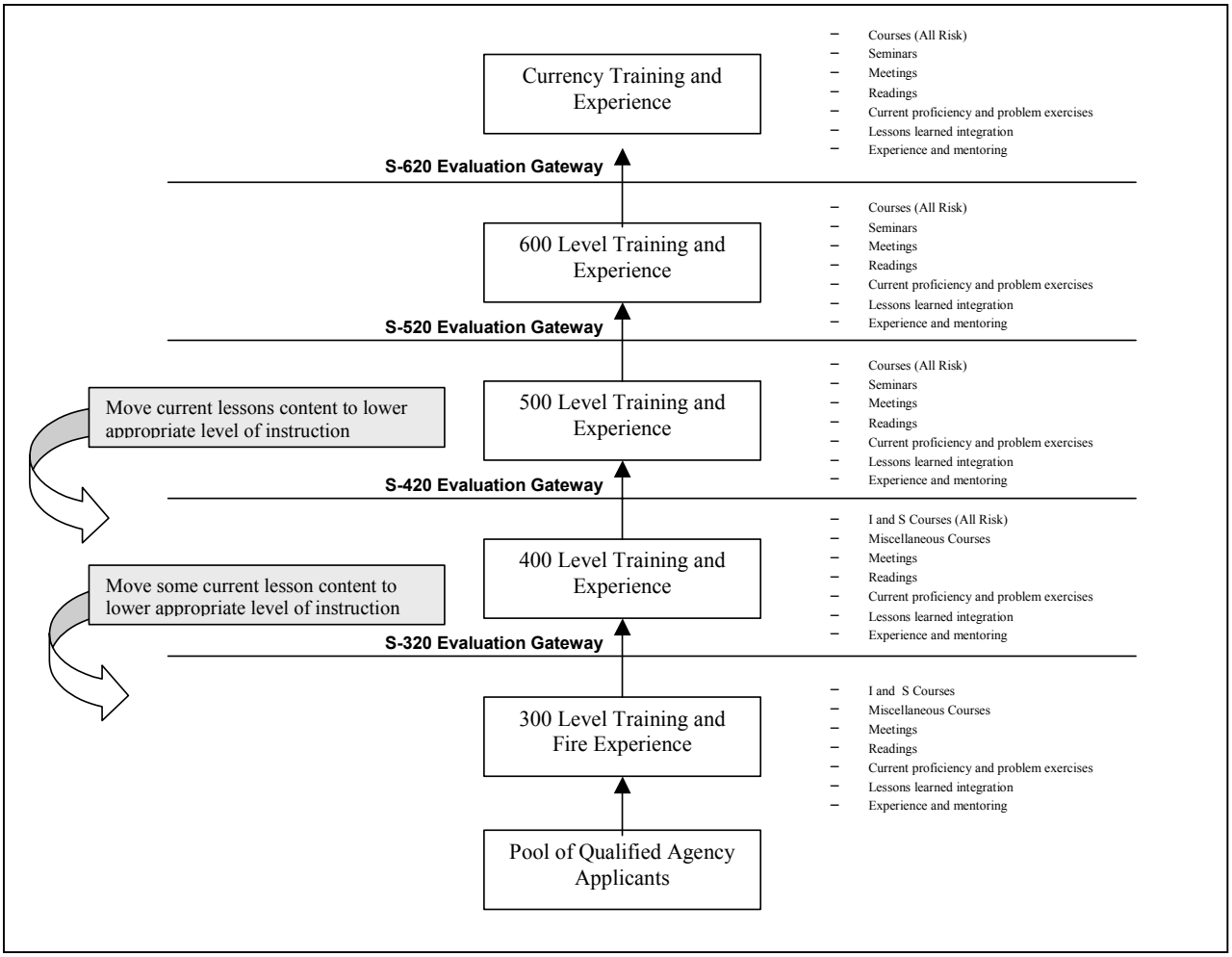
The Core: Redistribution of Content within the Existing Incident Management Curriculum

This model would describe that at each level of 100 through 600, content materials are delivered at appropriate points in the development of IMT personnel. There is redundancy in the training materials delivered at higher level courses because of the perceived need to "level the playing field". This is attributed to the lack of consistency and quality of training on a national level. The resulting implication is the added cost associated with not acquiring required skill and knowledge prior to evaluation.

This effort would entail a review of all current training content of I, S and L courses and determine which lessons or foundational content and learning objectives should be introduced earlier in the development of IMT command and general staff, and in optimum media. Also included in this effort would be the identification of content areas that are missing (e.g., all-risk missions, etc.). This approach would then establish a solid foundation for evaluation at each level (300, 400, 500, 600).

The following chart describes the redistribution of content and the types of deliveries of training media that could be appropriate depending on the material or information. To illustrate an example, the course content at 520 covers a lesson on transition and transfer of command. This material is a foundation piece that should be presented at the 300 level for a Type III Incident Commander. More advanced content would be presented at the 400 level to address the complexity of the Type II and I environments. A student arriving for a 500-level evaluation would be well grounded and not require additional remediation training time at an S-520 evaluation. Under this model a proficiency evaluation (simulation) would be established as a competency "gateway" to the next level of development (e.g., S-320, S-420, S-520, S-620).

The CORE:
Redistribution of Training Content within Existing Curriculum



Cost of Training Content Redistribution

One of the more prominent problems cited has been the cost hit associated with the S-520/S-620 program. Unto itself, the simple redistribution of content to a lower level in the curriculum does not yield an immediate cost savings; however, systemically there are likely cost savings that would result from the collective effort.

- In the redistribution plan, there is a significant amount of content that will be moved from the classroom to alternative self-paced distributed media. The model proposed would demand that students be accountable and self-directed in their learning within the program. It is recognized that there will be an increased short-term cost in the development of new training media (e.g., online learning, self paced DVD, etc.).

- The long term cost of training, when calculated with associated return on investment, would be significantly reduced if the core program enabled students to graduate from the process with more service time prior to loss from the "the system" (e.g., retirement, resignations, deaths, etc.).

The Shell – College of Command & Staff

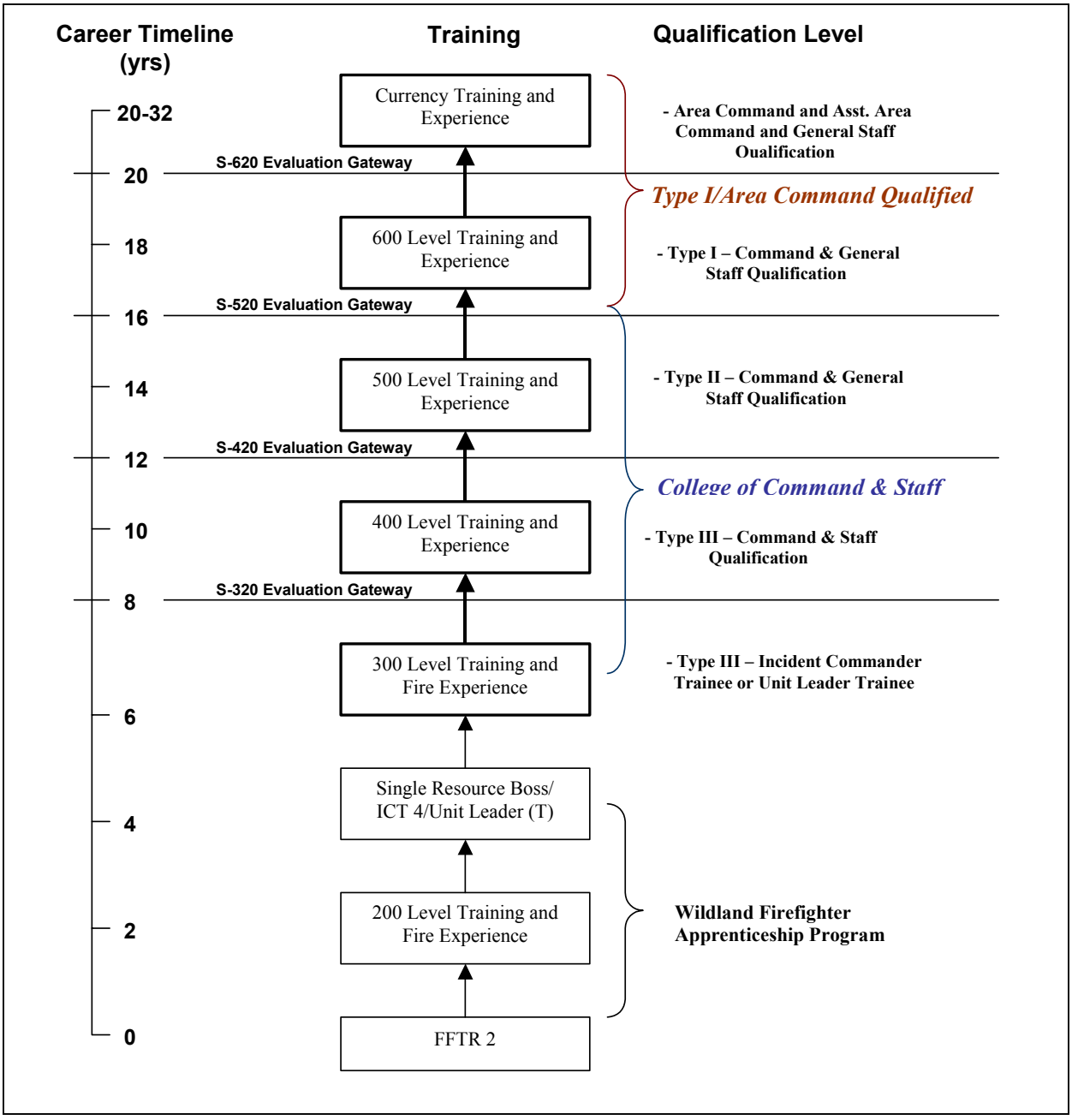
The model proposes to roll the current NWCG courses relating to incident management under a College of Command and Staff, which would:

- be available for use by all incident management personnel from federal, state, and local agencies.
- recruit and enroll trainees at an early part of their careers.
- manage the prerequisite and entry requirements to enter the College of Command and Staff.
- retain and manage student records and development plans.
- provide a framework for student-agency training and development agreements.
- oversee evaluation processes and standards.
- provide intense training and experience to move them up through the Incident Qualification System faster.
- provide a formal mechanism for mentoring, training and experience.
- manage the timely revision of the incident management curriculum to include emerging issues, lessons learned and policy changes.
- facilitate duel position qualification tracks (e.g., qualified in both Logistics & Operations)

The pool of entry level candidates for the College of Command and Staff would be current Type III Incident Commander and Unit Leader Trainees. Other individuals could enter the College of Command and Staff at the level of their current qualification. Courses that support incident management, such as Fire Behavior, Aviation, Fire Effects, would be managed under other colleges within the "University of Fire Management".

The chart below outlines the basic concept of the ”College of Command and Staff” including career timelines, training and qualifications.

Training and Experience Timeline



The University of Wildland Fire Management Concept

The "University of Fire Management" concept would encompass the full spectrum of incident management, fire, fuels, resource management and aviation related subjects to accomplish the Fire Management mission. Learning would be accomplished through a combination of formal presentations, simulations, readings, and distance learning in integrated curricula. This concept embraces centralized curriculum management but with decentralized delivery, using varied learning media formats and facilities as appropriate. Underpinning these curricula would be supporting functions such as the Wildland Fire Lessons Learned Center and wildland fire doctrinal development, as well as potential use of NIMO staff.

This virtual university would be comprised of a number of "colleges" whose focus would be on specific elements of the overall Fire and Aviation Management mission. An example of this organizational structure:

The *College of Command and Staff* would focus on incident management course delivery including I, S and L courses from the 300 to the 500 level. This college would take qualified Type III and unit leader trainees to the Type I level.

A *College of Fire in Resource Management* would provide the science and technical skills necessary to perform as a fire manager and meet IFPM standards. This college would emphasize fire effects, fire ecology and other courses in the science of wildland fire.

The *College of Fuels Management and Wildland Fire Use* would concentrate on Fuels Management, Wildland Fire Use, Prescribed Fire and Air Quality. Prescribed fire training centers would be integral components of this College.

The *College of Aviation* would prepare pilots and aviation managers and other personnel for their role in wildland fire and resource management support.

The foundation for the University of Wildland Fire Management is the entry level technical Wildland Firefighter Apprenticeship Program. The primary success of the apprenticeship program has been the agreement between the employee and agency as to the timetable for training and experience. This procedure would be adapted to each of the Colleges within the University. Other entry avenues are also recognized to accommodate other federal, state and local hiring programs.

The University of Wildland Fire Management would play an integral role in the development of federal Interagency Fire Program Management candidates through its various colleges, and by serving in a coordination and facilitation role.

This program would allow managers to identify students, based and performance and availability, with management skills and to quickly move them through training and experience. Several examples of this concept currently being implemented on a smaller scale are the Aviation and Logistics Academies in the California Geographic Area.

V. In Summary

Regardless……

Whether or not the proposed model is implemented, costs could be lowered in all cases by using more effective models for implementing the simulations and hosting training.

- The S-520/S-620 program is conducted entirely indoors. There are other training sites that may be better suited than NAFRI for hosting this course. The recent move from Pinal Air Park to Tucson has increased per diem rates by more than 60%. Moving to another facility which provides housing and meals on-site could result in substantial savings, even assuming the program as currently executed remains unchanged. For example, moving the program to the facilities at the Wildland Firefighter Apprenticeship Academy at McClellan, CA could save as much as $284,000 in per diem and meal costs per session (see Appendix F)

- The current training paradigm used in S-520/S-620 is based on a model that replaces the use of small practiced faculty with a large number of ad hoc high-grade personnel. No matter what decisions are made with the recommendations made in this report, these courses should be reexamined and revised to yield increased efficiency and effectiveness. Using local training resources and a more efficient staffing formula for simulations could result in savings in salary, per diem, and other travel costs.

Subsequent Actions

- Commence with an effort to evaluate the content of current courses (I series, S-series, and L series) to identify any redundant material and distribute to appropriate level of development. The evaluation would need to determine if there are important building blocks of development not present and establish appropriate media for delivery.

- Move 520/620 training that does not reinforce stress, inter connectivity, communication, teamwork, leadership, trust and speed to earlier in the training curriculum for the 500 and 600 level training.

- Develop a Command and Staff College to recruit and select candidates, develop training plans (including a timeline/schedule for training and experience), then mentor and coach these individuals as they move up through the qualification system. This may last from 8 to 12 years.

Organizational Linkages to this Project

To implement the actions within this report, the following organizations and entities must be consulted:

- National Wildfire Coordinating Group (NWCG) Parent Group
    - Training Working Team (TWT)
        - NWCG Leadership Committee
        - NWCG Training Development Group
    - Dept. of Homeland Security/Federal Emergency Mgt. Agency/Natl. Fire Admin.

- National Advanced Fire and Resource Institute (NAFRI)
    - L-480 Steering Committee
    - S-520 Steering Committee
    - S-620 Steering Committee

- National Fire and Aviation Executive Board (NFAEB)
    - Federal Fire Training Task Group (FFTTG)

Appendix A – Team Assessments on Original Objectives

Although the work of this assessment team was directed away from a detailed look at the current S-520 and S-620 programs, the team offers opinions on the original questions posed in the Statement of Work based on interviews and observations on site.

Q: *Are the agencies' needs being met and does the course content support the agencies' missions and goals? Are they compliant with existing policies?*
A: Much of the agency's immediate needs are probably being met through the use of the program, and the current content supports the agencies' fire missions, although it is not complete particularly regarding all-risk missions. The lessons are generally in compliance with policy.

Q: *Are student's needs being met in regards to course content and learning value?*
A: Yes and No. Regarding S-520, the content level is generally either too basic or redundant of previous programs to meet current needs. Learning value of the educational sections of S-520 is compromised by the expectation and stress of the evaluation. The student's needs for exposure to stress and feedback during the simulations are probably being met.

Regarding S-620, the program is meeting the needs of the student. S-620 is a legitimate stand alone component of the curriculum, whose content is properly placed in the curriculum. The confusion concerning learning or testing remains.

Q: *Is the course relevant to how the work is actually being performed in the field?*
A: The academic material appears to be aimed at the Type II level. The simulations appear to be closer to Type I, but the testing of these is not standardized among evaluators.

Q: *Are the adult education principles being used?*
A: Yes. This has improved quite a bit over the past cycles.

Q: *Is the use of new technology and advances in simulation being incorporated into the course?*
A: See Appendix G for further discussion of simulation and evaluation.

Q: *Are linkages with other existing NWCG course work being made?*
A: These programs are not well-linked to lower level NWCG incident management courses, since the NWCG 100-400 level courses were developed independently from the NARTC/NAFRI programs.

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Appendix B – List of Reviewed Substantive Material

- S-520 and S-620 Training Materials 2005 (NAFRI)
- S-520/S-620 internal logistics documents 2005 (NAFRI)
- Complex Incident Management Course (CIMC) training plan 2005 (NAFRI)
- *2004 Survey of S-520/S-620 Graduates* (Wildland Fire Lessons Learned Center)
- *Advanced Incident Management/Area Command (S-520/620)*, NAFRI memo to National Fire & Aviation Executive Board, January 9, 2004
- S-420 Studies:
    - Draft Geographic Area Training Representatives (GATR) issue paper *Command and General Staff S-420 Course* (R. Caballero)
    - Apr 2004 *S-420 Task Group Report* (NWCG)
    - Oct 02, 2003 *Command and General Staff S-420 Course* Issue Paper to NWCG TWT from Chair GATR
- *MCS L-480 Technical Proposal*, NWCG Training Working Team October, 2004 (NAFRI, L. McDonald/Mission-Centered Solutions)
- Report of S-520 Simulation, Feb 14, 2003 (D. Leonard)
- May 2002 National Incident Management and Area Command Needs and Training - white paper for NARTC, (M. Edrington/OQA)
- 2001 Report to the Fire Control Officers Group – Darwin, on the *Advanced Incident Management Course (S-520)* (M. Coulter, R. Caddell, A. Jackson, D. Rewet)
- 1999 *Fire and Aviation Management Framework for Advanced Learning* (NARTC/Brookings Institute)

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Appendix C – S-520/S-620 Execution Requirements

520/620 Personnel Requirements

2005 520/620 DAILY ESTIMATED PERSON COUNT

DAY	NARTC SUPPORT	STUDENTS	FACULTY, COACHES & FUNCTIONAL EXPERTS	SUPPORT PLAYERS	SIM TEAM MEMBERS	OTHERS/ VISITORS	TOTALS
Sunday Day 1	8	84	50	0	0	0	142
Monday Day 2	10	84	56	0	0	4	154
Tuesday Day 3	10	84	56	0	0	4	154
Wednesday Day 4	12	96	60	0	30	4	202
Thursday Day 5	12	96	62	20	38	6	234
Friday Day 6	12	96	62	20	38	6	234
Saturday Day 7	**WEEKEND - NOTHING SCHEDULED**						
Sunday Day 8							
Monday Day 9	10	96	62	0	32	6	206
Tuesday Day 10	12	96	62	16	32	6	224
Wednesday Day 11	12	92	60	16	32	6	218
Thursday Day 12	12	88	60	16	32	6	214
Friday Day 13	8	84	50	0	0	0	142

520/620 Facility Requirements

Classrooms

- 1 Large Auditorium to hold at least 96 students, plus 40 faculty and simulation (sim) team members (not all need to be seated).
- 1 Large Classroom to hold 42 students, plus 8 faculty.
- 1 Medium Classroom to hold 12 Area Command (S-620) students or 28 Advanced Incident Management (S-520) students, plus 10 faculty.
- 7 Breakout Rooms for Functional Roles and Responsibilities to hold 12 students, plus 3 Functional Experts.

Team Rooms

- 12 Team Rooms that teams consisting of 7 team members and 1 or 2 coaches, can call their own in which they can meet at any time.

Simulation Rooms

Chester Simulation

- 6 rooms large enough for a 7-member team, 3 support players, and 2 evaluators.
- 6 simulation rooms for 6-member simulation teams plus 2 Media Center personnel, and a standby area for 2 Role Players for each sim team.

Southwest Montana Simulation

- 4 rooms large enough for a 7-member team, 3 support players, and 2 evaluators.
- 1 room for 4-member Area Command team, 2 support players, and 2 evaluators.
- 5 simulation rooms for 5-person simulation teams.
- 1 simulation room for 10-person real world simulation team, including Media Center personnel, plus a standby area for 10 Role Players.

Daily Breakdown of Facility Requirements

DAY	REQUIREMENTS
Sunday, Day 1	Large Auditorium for 84 students 12 Team Rooms
Monday, Day 2	Large Auditorium for 42 or 84 students Large Classroom for 42 students 12 Team Rooms
Tuesday, Day 3	Large Auditorium for 42 or 84 students Large Classroom for 42 students 12 Team Rooms 7 Functional Breakout Rooms
Wednesday, Day 4	Large Auditorium for 42 or 84 students Large Classroom for 42 students 12 Team Room Medium Classroom for 12 Area Command students 6 Sim Rooms for setup
Thursday, Day 5	Large Auditorium for 42 students 6 Sim Team Rooms for 12 people: 7 team, 3 support, and 2 evaluators 6 Sim Rooms for 6-member Sim Teams, plus 2 Media Center personnel 12 Team Rooms Medium Classroom for 12 Area Command students
Friday, Day 6	Large Auditorium for 42 students 6 Sim Team Rooms for 12 people: 7 team, 3 support, and 2 evaluators 6 Sim Rooms for 6-member Sim Teams, plus 2 Media Center personnel 12 Team Rooms Medium Classroom for 12 Area Command students
Saturday, Day 7	12 Team Rooms
Sunday, Day 8	12 Team Rooms
Monday, Day 9	Large Auditorium for 96 students Medium Classroom for 12 students 12 Team Rooms 6 Sim Rooms for setup
Tuesday, Day 10	Large Auditorium for 28 students Medium Classroom for 28 students 5 Sim Team Rooms - 32 students, 14 Support Players, 10 Evaluators 5 Sim Team Rooms - 30 Sim Team Players, plus 20 Role Players 12 Team Rooms
Wednesday, Day 11	Large Auditorium for 28 students Medium Classroom for 28 students 5 Sim Team Rooms - 32 students, 14 Support Players, 10 Evaluators 5 Sim Team Rooms - 30 Sim Team Players, plus 20 Role Players 12 Team Rooms
Thursday, Day 12	Large Auditorium for 28 students Medium Classroom for 28 students 5 Sim Team Rooms - 32 students, 14 Support Players, 10 Evaluators 5 SimTeam Rooms - 30 Sim Team Players, plus 20 Role Players 12 Team Rooms
Thursday, Day 12	Large Auditorium for 28 students Medium Classroom for 28 students 5 Sim Team Rooms - 32 students, 14 Support Players, 10 Evaluators 5 SimTeam Rooms - 30 Sim Team Players, plus 20 Role Players 12 Team Rooms
Friday, Day 13	Large Auditorium for 84 students

Student Support Requirements

Student lounge area for coffee, soft drinks, mail, messages, and phones.

Simulation and Exercise Equipment Requirements

48 wall size 215 and 215A's.
1+ flipchart in all team rooms and simulation rooms, for a total of 24 flipcharts.
12 Team Boxes (contents of boxes vary for each exercise) for a total of 48 Boxes

Forest Lake Exercise
Juniper Prairie Exercise
Chester Simulation
Southwest Montana Simulation.

Chester Simulation Communication Needs

3 phones per Team Room	= 18 phones
3 phones per Sim Room	= 18 phones
2 phones for Media Center	= 2 phones
1 phone for Sim Supervisor	= 1 phone
3 radios per Team Room	= 18 radios
on two frequencies	= 12 frequencies
2 radios per Sim Room	= 12 radios

Copy machines	1 per Team Room	= 6 copiers
Fax Boxes	1 per Team Room	= 6 Fax Boxes
Fax Boxes	1 per Sim Team Room	= 6 Fax Boxes

Totals:
39 phones with different numbers
30 radios on 12 frequencies
6 Copy Machines
12 Fax Boxes

Southwest Montana Simulation Communication Needs

3 phones per Team Room for (4)Team Rooms	= 12 phones
4 phones for Area Command Team Room	= 4 phones
3 phones per (4) Sim Team Rooms	= 12 phones
7 phones for Real World Sim Team Room	= 7 phones
2 phones for Media Center	= 2 phones
1 phone for Sim Supervisor	= 1 phone
3 radios per Team Room	= 12 radios
2 radios per Sim Team Room	= 8 radios
2 radios for Area Command Team Room	= 2 radios
1 radio for Real World Sim Team Room	= 1 radio
1 frequency for each fire	= 4 frequencies

1 frequency for airnet (all fires and Area Command on same frequencies).

Copy machines	1 per Team Room	= 4 copiers
Copy machines	1 per Area Command	= 1 copier
Fax Boxes	1 per Team	= 4 Fax Boxes
Fax Boxes	1 for Area Command	= 1 Fax Box
Fax Boxes	1 per Sim Team Room	= 4 Fax Boxes
Fax Boxes	1 for Real World	= 1 Fax Box

Totals: * 38 phones with different numbers
23 radios on 5 frequencies
5 Copy Machines
10 Fax Boxes

* To utilize the same rooms for both simulations, 41 separate phone lines are needed.

Chester Simulation Support Player Needs

1 Resource Unit Leader per team
1 Radio Operator/Message Center Recorder per team
1 Technical Specialist Clerk per team
2 Information Officers for Media Center

Totals: 6 Resource Unit Leaders for two days
6 Radio Operator/Message Center Recorders for two days
6 Technical Specialist Clerks for two days
2 Information Officers for two days

Southwest Montana Support Player Needs

1 Resource Unit Leader per team
1 Radio Operator/Message Center Recorder per team
1 Technical Support Specialist Clerk per team
1 Radio Operator/Message Center Recorder for Area Command
1 Technical Support Specialist Clerk for Area Command
2 Information Officers for Media Center

Totals: 4 Resource Unit Leaders for 3 days
5 Radio Operator/Message Center Recorders for 3 days
5 Technical Support Specialist Clerks for 3 days
2 Information Officers for three days

On Simulations Days 5, 6, 10, 11, and 12, lunches need to be provided to teams in simulation, plus sim teams, support players, evaluators, and role players. 125 lunches will be needed per simulation day for a total of 625 lunches for the entire simulation.

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Appendix D – NIMO Transition

As the National Incident Management Organization (NIMO) is implemented the wildland fire management agencies will transition from 17 Type I teams and 35 Type II teams to 50 +/- Geographic Incident Management Teams and 7+/- NIMO teams. National Incident Management Organization will be structured to have 7 team members in command and general staff positions. The personnel will be dedicated to be available for complex wildland fire and all-risk incidents. The expectation is that they will dedicate significant time developing and providing training, conducting prescribed fire and providing other support.

Current Situation	Transition Organization	Future Organization
4 Area Command	4 Area Command	4 Area Command
—	7 +/- NIMO Teams	7 +/- NIMO Teams
17 Type I Teams	17 Type I Teams	—
35 Type II Teams	35 Type II Teams	50 +/- Geographic Teams
Type III Teams (#TBD)	Type III Teams (#TBD)	Type III Teams (#TBD)

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Appendix E - Redistribution of S-520 Content

The assessment team examined the current content of the 2005 S-520 program in light of current needs. Following is a preliminary sort of each content section, and a description of the recommended position of the content in the curriculum if applicable. If the content is redundant of information contained in other courses, this location was marked. This analysis is a rough cut based upon a relatively quick examination of the existing content contained in the current course book.

CURRENT S-520			PRESENT LOCATION or RECOMMENDED FUTURE LOCATION of CONTENT:	NOTES:
UNIT	TOPIC	DESCRIPTION		
I	Prework	**Preparing for Success**	S-400 Courses	
II	A	**Management and Functional Responsibility**	I- 400, S-400 Courses Fire Program Mgt.	
II	B	**Media/Community Relations**	S-400, S-403, S-420 Fire Program Mgt.	
II	C	**Team Development**	S-420, Reading	Topic is appropriate for S-520, but requires new content more appropriate for the 500 level.
II	D	**Cost Effective Mgt.**	400 Level Courses Fire Program Mgt.	
III	A	**IMT/AA Interaction**	400 Level Courses Fire Program Mgt.	
III	B	**External Influences**	400 Level Courses Fire Program Mgt.	
III	C	**Transfer of Command**	S-400,S-430,S-420,I-400 Fire Program Mgt.	
III	D	**Internal Influences**	400 Level Courses Fire Program Mgt.	
III	E	**Incident/AC/MAC**	I-400,S-400,S-420 Fire Program Mgt.	
III	F	**Strategic Leadership**	400 Level Courses Fire Program Mgt., Reading	Topic is appropriate for S-520, but requires new content more appropriate for the 500 level.
IV	A	**Fuels**	Reading while still at 400 level Fire Program Mgt.	
IV	B	**Structures in the Wildland Interface**	S-430,S-400,S-420 Fire Program Mgt., Reading	

IV	**C**	**Military Resources**	Reading/Online	
IV	**D**	**WFIP Stage 1**	Reading/Online Fire Program Mgt.	
VI	**A**	**Non-Fire Incident Mgt.**	400 level courses, Reading/Online, GACC Team Mtgs.	
VI	**B**	**Homeland Security/NRP**	Reading/Online, Team Mtgs	
VI	**C**	**Emerging Issues**		Topic is appropriate for S-520, assuming the correct issues are selected for the level.
VI	**D**	**Lessons Learned**	Reading, Team Mtgs	

Appendix F – S-520/S-620 Comparative Per Diem Cost

S-520/620 Student Costs				Feb. 7, 2005		
Day	**Students**	**Faculty Coaches**	**Support Players**	**SIM Team Members**	**Others**	
1	84	50	0	0	0	
2	84	56	0	0	4	
3	96	56	0	0	4	
4	96	60	0	30	4	
5	96	62	20	38	6	
6	96	62	20	38	6	
7	96	62	16	32	6	
8	96	62	16	32	6	
9	96	62	16	32	6	
10	96	62	16	32	6	
11	92	60	16	32	6	
12	88	60	16	32	6	
13	84	50	0	0	0	
Per Diem Days:	**1200**	**764**	**136**	**298**	**60**	**= 2,458**

NAFRI		
Hotel:	**$115.50**	**per night**
Per Diem	**$43.00**	**per day**
Total Per Diem Cost:		**$105,694**
Total Hotel Costs:		**$283,899**
Total:		**$389,593**

McClellan		
Dorm:	24.00*	per night
Meals:	22.45	per day
Misc.	2.00	per day
Total Per Diem Cost:		**$58,992**
Total Dorm Costs*:		**$41,712**
Total Misc. Costs:		**$4,916**
Total:		**$105,620**

Total Savings McClellan: $283,973

* cost per two students per room.

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Appendix G – Current Simulation Practices and Recommendations

Introduction – Overview

The S-520/S-620 course utilizes exercises and simulations to evaluate student performance.

The current course structure S-520 utilizes an introduction exercise called the Forest Lake exercise. The teams are provided a second practice exercise called the Juniper Prairie exercise. These two tabletop exercises provide an opportunity for the teams to develop and establish team dynamics, group cohesion and to perform their assigned duties and responsibilities. Team dynamics and cohesion are not stated objectives but are implied. These two exercises are coach supported.

The coach concept is a value added approach, to help facilitate the process and the unstated objectives mentioned above. The Chester Incident and Southwest Montana simulations utilize a graded evaluation format.

The area command students arrive mid-week and do not have any involvement or interaction with the S-520 student exercises conducted during the first week of the course. These students participate in the final simulation, establishing an area command team for the 4 complexes. Each IMT manages a complex of incidents, comprising suppression fires and fire use. All four complexes are varied and specific simulation materials have been stylized with inputs that have reasonable aligned inputs for evaluation.

Facility

The new NAFRI facility has been used for the first time for the magnitude and scope of the S-520/S-620 simulations. The layout and use of the facility to support the simulations is in a test phase. This has been predicated on prior simulations conducted at the NARTC facility. This first course will dictate some level of re-arrangement based on this experience.

Layout configuration requirements:

The two primary simulations (Chester and the Southwest Montana) require rooms for 4-6 IMT and 1 AC posts. Each IMT/AC team is supported by a simulation group. A separate simulation group is established as the "real world", which is responsible for supporting area command and role playing activities for all incident complexes. Total space requirements are 10 separate rooms to support the final simulation. The Chester incident required 2 additional ICP team rooms and 2 simulation group rooms for a total of 14 rooms. Detailed breakdown is documented in Appendix C for room, personnel and support requirements.

Capacity

The facility is operating at its absolute maximum capacity for this course. The indicator is the amount of overflow into the administrative areas. Additionally, the ICP rooms are too small to accommodate the team of 8 personnel, three support personnel, two evaluators, role players and any observers.

Forest Lake and Juniper Prairie practice exercises

Media delivery method

Operations Section Chiefs view a video of a flight over the incident. The video gives the students an overview of the topography, current fire activity and a distance view of the vegetation. The students are also provided a narrative orientation of the scene being viewed.

Exercise format

Simulation group organization
The exercises are coach-directed. The coach provides any answers and direction the team needs to perform and meet the stated objectives. Intent is to provide expert assistance as warranted during the exercise, and help the IC facilitate quality after action review of team processes.

Input delivery method
These are simple tabletop simulations requiring only prepared informational documents and a series of handout sheets. Each team member receives at least one handout sheet. The handout contains key information, some of which is important to share with the team or other individual team members.

Stated exercise objectives (what is measured)

1. Demonstrate individual competencies and team interactions to develop Incident Objectives (ICS 202)
2. Display team strengths and individual competencies necessary to develop an Operational Planning Worksheet (ICS 215) and LCES worksheet (ICS 215A)
3. After these products are developed (1045), identify the most critical tasks to be completed by each functional position to ensure successful implementation of the IAP, and document these tasks in bullet statements

Chester and Southwest Montana Simulations

Media delivery method

Both simulations are intensive interactive format designs. They are ideal for simulating the operational environment, creating specialized problem solving opportunities. The media support includes the use of role players, video overviews, live 2-way radio and telephone inputs, and specific built documentation.

Simulation Teams

The simulation management is conducted by a team which is comprised of a team leader and 4 to 5 personnel.

Beyond the team leader, two or three individuals provide voice inputs for tactical information, one individual tracks resource assignments and locations, one individual serves as a base camp contact (phone or radio). Additionally, the team maintains a liaison/representative with the "real world" simulation team to track and support inputs.

The "real world" team provides role players, media center, finance group, resource advisors and any specialized roles required. This relay and coordination process is excellent for the interaction and support for the area command simulation and provides quality control of information. The "real world" tracks the master input status.

The evaluators have contact with their assigned simulation team to control the flow and the follow-up on input deliveries. The simulation organization requires a large number of personnel to conduct complex scenarios of this type. The requirements are detailed in Appendix C Execution Requirements.

Input delivery method

The simulations use standard timed input delivery sheets. They provide a brief description of the expected outcome or intent. The inputs can be delivered in a variety of appropriate methods; including fax, phone, radio, and in person. The simulations require a high level of coordination, with 5 groups being simultaneously evaluated.

Stated simulation objectives (what is measured)

The simulations contain a single objective:

1. *Successfully demonstrate individual and Incident Management Team or Area Command Team performance during the simulated incident.*

Evaluation Process for the Chester and the Southwest Montana Simulation
The simulations and exercises are well-developed formats and generally managed well. True to the nature of evaluations of this type, the cadre has gone through numerous evolutions and refinement in trying to establish a base criterion for grading the students' performance that attempts to reduce subjective evaluations.

There are differences in the rating scales used by the simulation team (0-3) and the evaluators (1-5) in measuring the same inputs. Both these measurement scales lack adequate definitions of what constitutes each score.

Simulation Practices

Forest Lake/Juniper Prairie Exercises:

1. With the increasing use of Type I-3 IMTs , and the introduction of NIMO, for a variety of non fire risks, it is appropriate that at least one simulation should be based upon a non-fire risk incident such as a flood. For example, the 2005 Complex Incident Management Course used simulations based on a flood and a terrorist attack as well as a major fire.

2. These are cost effective exercises, which are coach-directed, are relatively simple, and yield significant learning value. The learning objectives are more tightly measured and controlled than in the final two simulations

Global Comments/Recommendations:

1. ***NWCG ensures that valid, reliable, consistent, measurable performance objectives be written for individuals and teams, and a process developed that allows them to be mapped through each simulation.*** The objectives for evaluated events are too vague, and in some cases, contradictory to accomplish standardized evaluation. Mapping the testing objective, through a critical input, to an observable behavior and rating is difficult in the existing materials.

2. ***Team dynamics and interaction objectives should be reviewed and formalized to describe the desired outcomes in all simulations.*** There are considerable variations in the faculty understanding of how these materials should be presented or measured.

3. ***NWCG ensures that one definitive, consistent scoring chart be developed for evaluators and simulation teams.*** The scoring chart will ensure that all scoring points are described to reduce subjectivity.

4. ***NAFRI should provide better real time observation views of the simulated incident to provide better situational awareness for students.*** Currently Operations Section Chiefs are provided a one-time aerial video of the incident and a perimeter map. A 3-D computer generated simulation program will be available by October of 2005 that will be able to display large complex incidents. The use of this software would allow the Operations Section Chief to take a real time observation view of the incident and that would aid in their decision making process and allow for a more interactive dialog with the simulation group. The simulation program would be based on real geographic layout and vegetation which would add a greater degree of realism and fidelity to the simulation.

5. ***NAFRI should consider changes to reduce the number of participants (teams) in the course or to find a larger venue.*** The size of the class is beyond the capacity of the of the NAFRI facility. During the simulation there are 13 individuals (students, coaches, evaluators and support personnel) in the team rooms at one time. These rooms are much too small for this type of simulation.

6. ***To prevent uneven simulation execution from cycle to cycle, NAFRI should consider activating parts of the simulation team for earlier practice exercises as a dry run.*** During the execution of the first full simulation the cadre was faced with a series of problems typical of a "first run".

Cost effective measures

1. ***NAFRI should consider using local employees and drama students from neighboring colleges and universities as simulation team members and "real world" role players.*** There are significant costs to bringing in role players and support personnel from long distances. Calculated conservatively this cost exceeds $160,000 in travel and per diem expenses.

2. ***NAFRI should examine involving S-520/S-620 students in supporting roles during the simulation.*** This approach has been successfully used to reduce cost and improve learning in past programs, and is used in the current L-381.