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### MEMORANDUM FOR THE UNDERSECRETARY OF DEFENSE (ACQUISITION, TECHNOLOGY, AND LOGISTICS), CHAIRMAN, INFRASTRUCTURE STEERING GROUP

SUBJECT: Final Supply and Storage JCSG Military Value Report, Post-Analysis

Your memorandum on November 9, 2004 directed that each Joint Cross Service Group submit an initial (post-analysis) military value report on November 17, 2004 and updates thereafter. We stated with the submission of our November report that we would provide a final military value report no later than December 10, 2004. With a final data issues resolved, we elected to submit a second "final" report until the array of scores had become stabilized. This report, dated April 21, 2005, represents a subsequent submission of our final report (with the first "final" report dated January 11, 2005).

Although the Supply and Storage approach to Military Value has remained unchanged since our November report, data changes have resulted in the following differences in this report:

a. Appendix H, Military Value Scores (based on the master database update of April 21, 2005)

(1) Inventory Control Points: The overall ranking shifted from the 11 Jan 05, report. The number one ranked Activity within the services and DLA did not change.

(2) Defense Distribution Depots: In the Central region, the top-ranked Activity changed. In all other regions, the number one ranked Activity within each region remained the same.

(3) Defense Reutilization and Marketing Offices: The overall ranking of Activities changed. (No scenarios involve DRMOs.)

b. Appendix G, Data Problems and Scoring Remedies: Resolved issues have been deleted from this Appendix.

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Attachment  
Military Value Analysis Report dated April 21, 2005

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## Supply and Storage Joint Cross-Service Group



# MILITARY VALUE ANALYSIS FINAL REPORT To the INFRASTRUCTURE STEERING GROUP

21 April 2005

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## SECTION 1: INTRODUCTION

The Military Value guidance to the Supply and Storage Joint Cross-Service Group (S&S JCSG) detailed the requirement of designing attributes, metrics, data call questions and a quantitative scoring plan to array the relative military value of supply and storage activities across the Department of Defense (DoD). As previously reported, the S&S JCSG's approach divides the DoD supply and storage activities into three core functions: supply, storage, and distribution. To this end, the S&S JCSG, comprised of individuals representing all Services and the Defense Logistics Agency (DLA), crafted a methodology to analyze the military value of supply, storage and distribution functions around the fifty states, the District of Columbia, Guam, Puerto Rico and Samoa. The S&S JCSG conducted military value analysis according to this methodology within categorical groupings of activities, namely Inventory Control Points (ICPs), Defense Distribution Depots (DDD) and Defense Reutilization and Marketing Offices (DRMOs).

The S&S JCSG envisioned a strategically integrated, network-centric, supply chain with sufficient size and capability to provide reliable, flexible, efficient and operationally responsive combat support. The strategic integration of the supply, storage and distribution activities throughout the supply chain was driven by combat force sustainment and the accommodation of surge requirements supporting operational demands.

Two overarching factors heavily influenced the S&S JCSG's approach to analyzing Military Value: the diversity of the commodities managed throughout the DoD supply chain and current real world surge requirements by all four Services and DLA.

Complexity Factor Metrics used throughout the S&S JCSG military value analysis differentiated effectiveness and efficiency within commodity groups but did not account for the differences in management difficulty across commodity groups. The S&S JCSG developed a "Complexity Factor" (C-factor) to address this issue. This factoring device adjusted military value scores on a one-time basis for nine metrics where commodity management difficulty varied. The C-factor eliminated the need to parse questions by commodity and collect large and complex amounts of data to reach the similar conclusions.

The C-factor adjusted scores across materiel categories by accounting for two dimensions of management difficulty. The first dimension was by commodity type, such as Aviation, Fuels, Subsistence, Electronics, or Armaments. The second dimension was by product groups (i.e. end items, reparables and consumables). Both dimensions were arrayed along a scale from 0.00 to 1.00. These dimensions were rolled into a single complexity factor for each Activity. Part 1 of Appendix C provides a detailed explanation of the complexity factor. Part 2 of Appendix C provides a "Header Question" in the form of a table. This table comprises what the field completed during the data call. Part 3 of Appendix C provides an example of how the S&S JCSG calculated an Activity's C-factor.

A detailed list of commodity type and product group definitions was included in the OSD BRAC Library and distributed with the data call. This list provides detailed guidance concerning how activities should properly sort their commodity inventories.

Evaluating the management difficulty across commodity types and product groups was a subjective undertaking. An S&S JCSG sponsored working group met numerous times to establish a reasonable and logical framework to judge commodity management difficulty and appraisal of commodity types and product groups in an orderly and disciplined fashion. This “at large” working group brought a wide range of logistical backgrounds to bear in making this assessment. Each commodity type was analyzed for inventory management complexity and difficulty along the lines of legal restrictions, safety requirements, security requirements, technical aspects and sources of supply. The working group discussed, debated, voted, ranked and scored each area while populating two decision tables (one table for commodity types and another for product groups) before assigning weights. The values assigned to each commodity type and product group are shown in the Complexity Factor Calculation Worksheet in Part 3 of Appendix C.

Surge Considerations For more than two years the Military Services have been vigorously conducting combat operations in several theatres, most notably Afghanistan and Iraq. The logistics build up, or surge, requirements for these operations have challenged activities within the supply system<sup>1</sup> to varying degrees and at varying times. Due to the different roles of the Military Services and DLA during combat operations, consideration was given to the impact and timing of surge requirements on Service-specific supply systems. Debate within the S&S JCSG, as to when and for what duration each Service surged, provided valuable insight into the need for a methodology to assess each activity’s military value with respect to each Service’s operations in a surge environment.

The S&S JCSG determined that the most appropriate course of action would be for each Activity to provide financial and performance data for the last three fiscal years (2001, 2002 and 2003). The data call responses then were averaged using all three years’ data<sup>2</sup>. The resulting score from this average reduced the high variability caused by Service and Defense Agency surge activity within each fiscal year’s data.

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<sup>1</sup> In this context the “supply system” encompasses all aspects of supply, storage and distribution.

<sup>2</sup> In order to avoid distorting the multi-year average because of data issues, this average was computed based only on each fiscal year for which data was complete. This is described further in Appendix G, Data Problems and Resolutions.

## **SECTION 2: APPROACH TO MILITARY VALUE ANALYSIS AND SCORING PLAN**

For each of the military value criteria, the S&S JCSG developed “characteristics” that brought a supply system context to the criteria by integrating the core functions (supply, storage, and distribution). In addition to these three functionally-oriented characteristics, the S&S JCSG designed a fourth characteristic to structurally capture the attributes, metrics, and questions that are common across all characteristics within a criterion. Characteristics provided the foundation for the attributes, metrics, and questions developed by the S&S JCSG. Characteristics also represented the second-order weighting of military value discussed in the scoring plan.

Since the characteristics were developed with core functions in mind, definitions of the core functions are revisited below. The lists of key “sub-functions” (originally provided in the S&S JCSG’s Capacity Report) serve well as definitions for each function. (Note that some sub-functions apply to more than one function.)

- ❖ Supply
  - Requirements Determination
  - Requisitioning
  - Requisition Processing
  - Stock Control
  - Shelf-life Management
  - Technical Support
  - Quality Assurance
- ❖ Storage
  - Physical Inventory Management
  - Materiel Handling
  - Materiel Issuing
  - Warehousing
  - Packaging
  - Preserving
  - Quality Assurance
- ❖ Distribution
  - Shipping
  - Materiel Handling
  - Traffic Management
  - Quality Assurance

In the next section, “Description of all Criteria and Characteristics,” the description of the criteria and characteristics are provided. The core function of each characteristic is also noted.

## **Description of all Criteria and Characteristics**

The weighting of criteria constituted the first-order of military value prioritization. Criteria 1 and 3 were viewed as most indicative of military value and received equal military value weights of 35 percent. These two criteria respectively represent: 1) support and sustain current operations and 2) support and sustain future joint, expeditionary operations. Criterion 2 represents the military value of facilities and land and received a weight of 20 percent. Finally, criterion 4 represents cost and manpower implications and received a weight of 10 percent.

- ❖ **Criterion 1:** The current and future mission capabilities and the impact on operational readiness of the Department of Defense's total force, including the impact on joint warfighting, training, and readiness.
  - **Characteristic 1. (SUPPLY):** Use modern and flexible inventory management processes to support and enhance operational readiness, as defined by requirements determination, acquisition, and stock control.
  - **Characteristic 2. (STORAGE):** Support and sustain the worldwide projection of military power, as defined by the capability to receive, store and issue supplies and materiel.
  - **Characteristic 3. (DISTRIBUTION)** Distribute supplies and materiel to joint forces worldwide in the most efficient and effective manner, as defined in terms of shipping, distance, and capacity.
  
- ❖ **Criterion 2:** The availability and condition of land, facilities, and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas and staging areas for the use of the Armed Forces in homeland defense missions) at both existing and potential receiving locations.
  - **Characteristic 1. (SUPPLY)** Operate from modern, efficient, and expandable infrastructure that enhances the inventory management process.
  - **Characteristic 2. (STORAGE)** Operate from modern, efficient, and expandable infrastructure that enhances receipt, storage, and issue functions.
  - **Characteristic 3. (DISTRIBUTION)** Operate from modern, efficient, and expandable infrastructure that enhances distribution operations.
  
- ❖ **Criterion 3:** The ability to accommodate contingency, mobilization, and future total force requirements at both existing and potential receiving locations to support operations and training.
  - **Characteristic 1. (SUPPLY)** A modern, flexible inventory management capability with sufficient capacity to adapt to future requirements as defined by personnel, information technology (IT), and infrastructure.
  - **Characteristic 2. (STORAGE)** A modern, flexible storage system capability with sufficient capacity to adapt to future requirements as defined by personnel, IT, and infrastructure.

- **Characteristic 3. (DISTRIBUTION)** A modern, flexible distribution system capability with sufficient capacity to adapt to future requirements as defined by personnel, IT, and infrastructure.
- ❖ **Criterion 4:** The cost of operations and the manpower implications.
  - **Characteristic 1. (SUPPLY)** Manage inventory processes to minimize cost and manpower requirements.
  - **Characteristic 2. (STORAGE)** Operate receipt, storage and issue functions that minimize cost and manpower.
  - **Characteristic 3. (DISTRIBUTION)** Conduct distribution operations that minimize cost.

### **Weighting the Attributes and Metrics**

The weighting plan, provided in Appendix A, outlines the elements of the scoring plan as they relate to each metric (e.g. for “metric x”, responses with high values receive more points than responses with lower values). Criterion-specific issues that merit additional discussion are outlined below.

Each criterion section describes second-order (i.e. characteristic) and third-order (i.e. attribute) weighting. Fourth-order (i.e. metric) weighting is included in Appendix A. Second-order weighting is noted by functional descriptor, e.g. the “distribution characteristic.”

#### Criterion 1: (35%)

**Supply (40%)** – Within the supply characteristic the flexibility and effectiveness of the processes are assigned more weight (40%) than the acquisition process (30%) and stock control (30%). The flexibility and effectiveness of the stock control process is measured in terms of stock held in excess of requirements, a ratio of items to personnel managing these items, and finally the percentage of managed items specifically designated for joint support.

**Storage (25%)** – The storage characteristic is comprised largely of receiving, storing and issuing materiel. Within this criterion the weighting plan places slightly more importance on issuing (40%) than storing (35%) and finally receiving (25%). In evaluating storage operations, the score plan places a higher importance on inventory accuracy (60%) but also considers effective utilization of space and cost of storage operations (40%).

**Distribution (35%)** – The analysis of the distribution characteristic focuses on each Activity’s proximity to distribution nodes and efficiency and effectiveness of the shipping activity. Slightly more importance is attached to distribution flexibility (55%) than to the efficiency and effectiveness of the operation (45%).

#### Criterion 2: (20%)

**Supply (35%)** – The supply characteristic attributes and metrics focus on how modern, flexible and functional the workspaces are with greatest emphasis placed on workspace

modernness (40%). This additional emphasis, while slight, recognizes that up-to-date and efficient workspaces allow an Activity to provide a more substantial contribution to future operations.

Storage (35%) – This section also focuses on how modern, flexible and functional storage workspaces are. With an eye towards the future, maximum possible retrievals are assigned more weight (60%) than current operating performance (20%) and efficiency (20%).

Distribution (30%) – Access to multiple distribution nodes (40%) is the most heavily weighted attribute. An Activity's ability to rapidly increase capability is assigned more weight (35%) than current capacity of available distribution nodes (25%).

Criterion 3: (35%)

Identical questions focused on the workforce and information technology, were asked within all three characteristics. To minimize the number of questions for the field, a fourth characteristic was created to capture these common elements. The distribution characteristic weighting is driven by the judgment that contingency and mobilization depends heavily on distribution.

Supply (25%) – This characteristic is more heavily process driven while storage is more infrastructure and facilities dependent. Accordingly, the quality of an Activity's workforce and IT infrastructure are the only considerations.

Storage (15%) – Within the storage characteristic, the condition and flexibility of the storage infrastructure receives more weighting (50%) than workforce (25%) and IT infrastructure (25%).

Distribution (60%) – The distribution characteristic has four equally weighted attributes: workforce, IT infrastructure, distribution flexibility, and distribution surge capability.

Criterion 4: (10%)

Equal weights were assigned to both the supply and storage characteristics (35%) with the balance assigned to distribution (30%).

**Scoring Plan**

The S&S JCSG scoring plan used 55 metrics to determine the military value of each Supply and Storage Activity. Table B1 in Appendix B provides the individual weights of all 55 metrics and the manner in which they were computed.

All field responses for each metric were normalized on a scale from 0.00 to 1.00. As a result, the Activity with the most preferred value for each metric received a normalized score of 1.00. Activities who do not perform a particular function (indicated by its

answer of N/A or zero<sup>3</sup> across all fiscal years for which data was requested) received zero military value points for that metric. The Activity who accomplished the function but had the least preferred value received a normalized score of 0.01. All other data responses were normalized between 0.01 and 1.00 using a linear function between the least and most preferred values. To ensure that outliers would not skew the scoring function, the “least preferred value” and “most preferred value” were restricted to values within two standard deviations of the data set mean. The normalization methods used and considered are described in more detail in Appendix B.

The normalized score of each metric was multiplied by the corresponding metric weight shown in Table B1. The product of this multiplication determined the military value contribution of an individual metric for each Supply and Storage Activity.<sup>4</sup>

This methodology enabled the S&S JCSG to consider the impact of not only each metric (fourth-order analysis as discussed earlier) but also each function (second-order analysis) and each criterion (first-order analysis) on determining the military value of an Activity. The military value scores were summed for each characteristic (supply, storage, distribution, and “common” questions) for the purpose of feeding the optimization model along with corresponding capacity results by function. The sum of the applicable military value contributions, from a maximum of 55 metrics, determined the military value of a Supply and Storage Activity.

#### **Quality Assurance Review and Sensitivity Analysis (Before Data):**

Before any data was collected, the score plan underwent a rigorous quality assurance review that considered clarity, answerability, and relative scores of each metric and its associated question(s). A team of representatives from each Service and DLA considered the clarity and answerability of each question. In addition, individual Service BRAC offices were contacted in regards to questions that required additional information.

In the course of this review, the S&S JCSG concluded that Activities with more than one mode of shipping capability merited additional scoring considerations. To account for modal and nodal capability, the S&S JCSG developed transportation factors (“T-factors”). The methodology concerning T-factors is provided in Appendix D.

The final portion of the quality assurance effort involved a sensitivity analysis that reviewed the military value of each metric. The military value of each metric was ranked and examined to ensure that the metrics’ values and relative standing were as intended when developed. As a result of this effort, S&S JCSG adjusted several metric weights.

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<sup>3</sup> For metrics where lower is considered better, a zero is a meaningful answer for an Activity that accomplishes the particular function and will not be scored the same as an “N/A” response.

<sup>4</sup> This methodology is expanded for all C-factor and T-factor questions.

Finally, the S&S JCSG understood that various dates for defining data input boundaries (e.g. FY03, etc.) would be provided by the ISG prior to questions being forwarded to Services and Agencies.

### **SECTION 3: DATA QUESTIONS**

Appendix E provides two tables that summarize the traits of the S&S JCSG's military value questions. Table E1 lists the capacity analysis questions (data call 1) that also serve as military value questions (avoiding the need to repeatedly ask the field the same questions). Table E2 lists the 58 questions entered into the Input Question Tool (IQT) for military value analysis (data call 2). Finally, Appendix E provides all military value questions in full detail, as entered into IQT. These questions were reviewed by the OSD Data Standardization Team prior to release to the field. Any changes made were editorial in nature and did not change the scoring plan given in Appendix A or the intent of the questions.

Considerable discussion occurred relative to which Activities should respond to the S&S JCSG questions, i.e.: "How should each question be targeted?" For the Services and DLA, all Activities determined to be "above the installation" in accordance with guidance provided in the OSD BRAC Library of Definitions should respond to the S&S JCSG's military value questions. (Note: All DLA Activities are considered above the installation and responded to these questions.)

For those Activities defined as "at or below the installation," it is less clear whether an Activity should respond. In general, those Activities considered operational or deployable were "below the installation" and did not respond to the questions. These organizations deal almost exclusively with retail level stocks.

Activities "at the installation level", both retail and wholesale, or exclusively wholesale, in nature responded to the questions. A recommended Activity list, by Service and DLA Activity, is provided in Appendix F. However, the S&S JCSG emphasized that this list is merely a recommendation and that the final determination should rest with the respective Service BRAC offices. (Capacity Analysis data was not available for review at the time this list was compiled.)

#### **SECTION 4: ISSUES IMPACTING ANALYSIS**

After the initial certified military value data set was received, a concerted effort to have Activities correct questionable data was pursued. Still, some apparent inconsistencies remain unresolved at the time this report was published. These remaining data problems, without intervention, may have disturbed the scoring of some or all Activities in a categorical grouping (e.g. ICPs). Consequently, the S&S JCSG investigated possible remedies for persistent data problems. The chosen remedies, described in Appendix G, are conservative, analytically sound, and enable the computation of reasonable and fair military values in the absence of “perfect” data.