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Plum Brook Station Reference

Guide for Preparation of Statements of Work

Approved by Plum Brook Management Office/7030:

**NASA - Glenn Research Center
Cleveland, OH 44135**

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GUIDE FOR PREPARATION OF STATEMENTS OF WORK

Introduction

The procurement of any hardware, software, or service by subcontract or purchase order requires that a statement of work (SOW) be generated for inclusion in the solicitation and the resultant contractual document. A work statement can best be described as a detailed delineation of NASA and subcontractor responsibilities in achieving the contracted end result. The SOW is not a specification in the sense of telling a contractor how to accomplish an objective. Rather, it is a narrative statement of what the objectives of the contract are and what specific tasks are to be pursued in attaining those objectives.

The preparation of a clear, concise, and complete statement of work is essential to sound procurement. Work statements must be individually tailored to, attain the desired degree of flexibility for subcontractor performance and creativity-both in submitting proposals and in contract performance. The SOW is more than a technical document, it is a communication between NASA and prospective subcontractors which (i) embodies a business arrangement, (ii) must be legally sufficient, and (iii) must completely define a situation in such a way as to be readily understandable and interpretable by all concerned. In addition, the SOW also must be:

- Compatible with Procurement Policies and Procedures.
- Organized in such a way that it is possible to estimate costs against it.
- Compatible with the generation of meaningful management information.
- Sufficient to permit competitive procurement by qualified prospective sources.

The SOW is the medium through which NASA procurement requirements are transmitted to industry. The quality of the SOW, therefore, will determine to a great degree the quality of the contracted result obtained and the effectiveness with which the procurement is administered. Any information either of an internal nature or instructions to prospective sources should be eliminated from the SOW and included in a separate submission to NASA Purchasing.

The research, development, and demonstration SOW may be one of two types; (i) level-of-effort, which require the furnishing of a technical effort and a report on the results thereof or, (ii) task completion, which require development of tangible end items to meet specific performance requirements. Research and development requirements are frequently intangible and subject to change; therefore, the SOW must be flexible enough to encompass the job to be done. Too narrow a work statement may unwisely restrict the efforts of the subcontractor and, frequently, supplemental agreements may have to be written to allow for contract modification. Conversely, a SOW may be written so broadly as to be unpriceable or legally unenforceable. Flexibility must be controlled in that there is a definitive description of desired objectives. In other words, the SOW must be specific enough to protect NASA's interests, yet broad enough to allow the subcontractor's creative efforts to be used.

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The nature of research and development efforts is such that the SOW is usually quite expansive, with little or no technical specification.

Conversely, fabrication work statements are often very brief with significant specifications appended. However, they must be absolutely clear and precise to ensure no misunderstanding of NASA's requirement or what the scope of the subcontractor's effort is to be.

Procurements of commercial off-the-shelf items, or relatively simple fabrication to NASA drawings may require only a single sentence work statement on the face of the Purchase Requisition.

Statement of work writers should ensure that objectives and performance requirements in the SOW are complete and clearly written in conventional language to the greatest extent practical. Total elimination of technical language is not required, but it should be reduced to essentials necessary to describe the task. The person responsible for preparing the SOW must keep in mind that excess technical language or technical constraints can affect the procurement beyond simply stating or directing the contract effort. It may also affect the number of sources willing and able to respond. A specific problem in this regard is the use of abbreviations, which have only a narrow understanding and can create contractual ambiguities. The test of an acceptable SOW is whether a complete understanding of the technical requirements, the tasks to be accomplished, the responsibilities of the parties, and the end result expected can be determined from reading the completed statement. Where questions remain unanswered, the SOW lacks completeness and should be modified. Examples of typical work statements can be found herein.

The requesting department/section is responsible for writing Statements of Work. The requisitioner of a procurement requirement is in the best position to describe fully that requirement in a narrative sense. The Buyer can assist in organizing the SOW and adding essential contractual language, but he cannot create in a technical environment. The requesting department/section must insure that Quality Assurance requirements are properly inserted in the SOW to ensure acceptable end products are delivered. The SOW is of necessity therefore, a combined effort among the three disciplines, Technical, Procurement, and Quality Safety, in order to develop a complete and sufficient document.

1.0 Planning for the Communication of Procurement Requirements

- 1.1 The process of communicating a procurement requirement demands detailed and specific planning. There is a direct link between the requirement, the cost and scheduling of the requirement, and the evaluation and selection of a successful subcontractor on a competitive basis. It is necessary for the requesting department/section to fully understand what is to be bought, how it is to be bought, and when in order to develop a complete work statement. Obviously, the extent of planning required is predicated on the complexity of the procurement.

1.2 The following schematic (Fig. 1) illustrates the planning and action process for developing the SOW and its accompanying data:

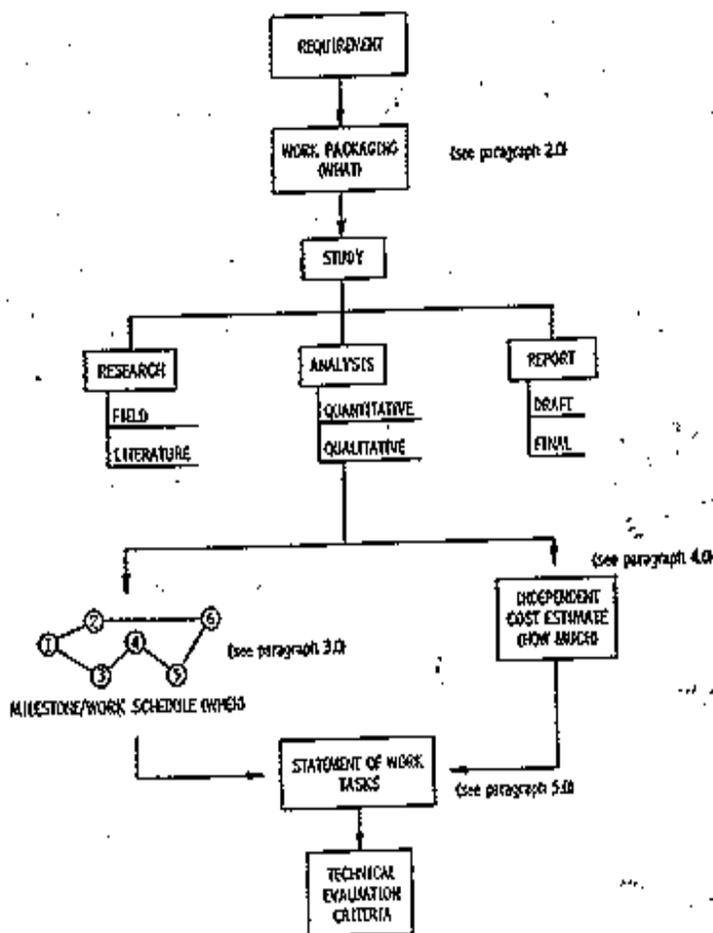


Fig. 1. Schematic of Procurement Planning

1.3 It is not required that work packages, milestone/work schedules, and independent estimates be developed prior to initiating the work statement. These items do, however, aid in understanding the procurement and making a better purchase. Purchasing is available to the requesting department/section to assist in these activities.

2.0 Developing Work Packages.

2.1 The SOW is the principal document against which prospective subcontractors' proposals are evaluated. Therefore, the SOW must be structured in such a way the evaluation criteria can be developed from it and proposals can logically flow from the prescribed tasks.

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In order that the technical tasks be internally consistent, it is beneficial to break the total effort into its integral parts as a prelude to SOW development. This practice (called work packaging) also assists in pinpointing the writer's own understanding of his requirement.

- 2.2 There are other benefits to separating a total effort into work packages. For example:
- The job is much easier to estimate by work package rather than in total.
 - Proposals will likely follow work package format (through structuring of the SOW) thus giving the Buyer an easier evaluation task.
 - Scheduling becomes clearer on the basis of integrated tasks, making it easier to determine which are concurrent and which are consecutive.
 - Separation of a job into work packages will often indicate to the requesting department/section areas where the specifics of a requirement are vague and, therefore, require further study or special treatment in the SOW.
- 2.3 Breakout of a total requirement into work packages cannot be formalized into a procedure, since each one will be different depending upon the scope and complexity of the individual effort. The exercise of work packaging can only be defined as a realistic separation of a total effort into its reasonable parts. Figure 2 illustrates how a work package matrix might reflect a study effort and a hardware fabrication.

3.0 Developing Milestone/Work Schedules

- 3.1 Another aspect of understanding fully the requirement being communicated to prospective subcontractors is the establishment of a work schedule. Work packaging is very beneficial in this activity in that it illustrates the individual tasks to be accomplished, and allows an assessment of how those tasks might be properly scheduled in sequence. As indicated above, concurrent and consecutive tasks can be determined and scheduled on a realistic basis. Scheduling also allows the requesting department/section to establish reasonable delivery dates for subcontractors, thus helping to ensure optimum pricing on their part.
- 3.2 Any scheduling method with which the requesting department/section is familiar and comfortable is acceptable. (PERT, CPM or Gantt charting are all good approaches.) The important thing is to be able to understand schedule constraints and sequencing so that the SOW will reflect them properly and prospective subcontractors will be able to propose more realistically.

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A sample of one scheduling method is illustrated in Fig. 3.

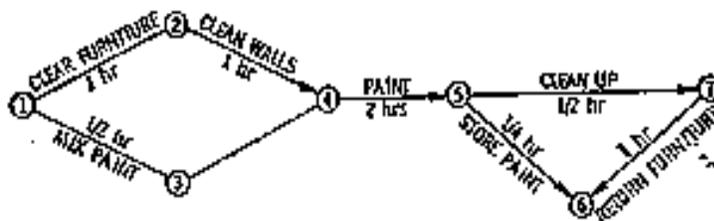


Fig. 3. Scheduling Illustration

4.0 Developing the Independent Cost Estimate (Labor-loading)

- 4.1 Each procurement requirement needs a dollar estimate for its accomplishment. This estimate is generated by the requesting department/section and is used to commit funds to the procurement, establish financial parameters on the work effort, and to evaluate prospective contractors' estimates in terms of the Governments' position. Obviously, this estimate should be as "real" as possible.
- 4.2 Work packaging can be of assistance in determining the estimate. It is significantly easier to build an estimate from the lowest work package level to the highest rather than try to estimate the total job as one lump sum.
- 4.3 In addition to the independent cost estimate, there is a second estimate, which is very important to the proposal evaluation process. It is the Governments' policy not to reveal proposed costs or prices to technical evaluators in order that they not be biased by dollars. This policy specifically applies where criteria other than cost are used as a basis for contractor evaluation and selection. This presents a difficulty to the technical evaluator in that he often cannot relate the prospective contractor's narrative proposal to reality without some quantitative measure of its intent. What the technical evaluator can use as an alternative is labor-loading. Labor-loading is the exercise of assessing the types and amounts of labor necessary to complete each work package and, subsequently, the total effort. Since each work package is essentially a technical task, labor-loading is made simpler by analyzing each task separately. Labor-loading can create the necessary bridge between technical narrative and realistic understanding of a proposal.

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The requesting department/section generates labor-loading by task as a part of the estimating process. Prospective subcontractors can be required to indicate labor-loading by task in their proposals. Thus, the technical evaluator will have a quantitative way to assess communication and understanding with prospective contractors without becoming involved in dollar estimates. Labor estimate differences between the requesting department/section and the prospective subcontractor may form the basis of negotiation.

5.0 Development of the Statement of Work

5.1 A typical work statement will contain six separate sections:

- Section 1. Introduction (Objectives) and Background Information
- Section 2. Scope
- Section 3. Applicable Documents and/or Specifications and/or Definitions
- Section 4. Technical Tasks and Quality Assurance
- Section 5. Reports, Data, and Deliverables
- Section 6. Other Special Considerations

5.2 As is true for the milestone schedule and the independent cost estimate the SOW flows directly from the work packages. Section 4 of the SOW entitled, "Technical Tasks and Quality Assurance," is a direct reflection of the lowest level of the work package matrix. Put another way, each lowest level activity is a work statement task. Similarly, the second level work package activities indicate the scope of the contractual requirement (Section 2), and the top level specifies the contract deliverable or overall effort.

5.3 The work package/technical task relationship indicates that the first job in developing the SOW is to complete Section 4, including with technical tasks the necessary management, quality, and control tasks to round out the entire effort. This action is followed by completing the Scope Section; then the Reports, Data, and Deliverables Section; finally, the Applicable Documents and/or Specifications and/or Definitions Section, and the Introduction and Background.

5.4 The completed work statement can then be used to generate specific evaluation criteria such as price, delivery, facilities, and technical capability for the technical evaluation of proposals submitted by prospective subcontractor. Each technical task can be individually analyzed to determine what criteria will best measure its understanding and effective.

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6.0 Specification for the Preparation of the Statement of Work

6.1 This specification shall govern the preparation of statements of work for NASA's subcontracts.

6.1.1 A statement of work is defined as a detailed delineation of NASA and subcontractor responsibilities in a contractual relationship to achieve an agreed to end result.

6.2 As previously stated, a statement of work shall consist of a title page and six sections. Each section plays a specific part in outlining the overall job to be done, so that the total will be a complete narrative of the contractual requirement. The contents of each of the sections is as follows:

6.2.1 Section 1 - Introduction (Objectives) and Background Information

The introduction is intended to give a brief overview of the current situation and leads to why this procurement is being pursued. The overall requirement which needs fulfillment, the present difficulties or deficiencies, which impact the requirement, and the determinations which must be made to solve inherent problems should be outlined briefly in fully understandable terms. Quite often an understanding of the value of the technical objective can be reinforced by inclusion of an explanation of the payoff that is expected. In framing the objective, think clearly on how the results will be used. The stated objective should be consistent with the funds planned and with the minimum requirements.

The background paragraph should include any information, explanations, or constraints, which are necessary in order to understand the requirement. Discuss how the procurement arose: indicate its relationship to previous, concurrent, and future operations, and relate details, which reveal its purpose and significance. Statements on the importance of the work may also be included. If any techniques or processes have previously been successful or ineffective, this should be noted. Frequently it is best to leave the writing of the background to the last. This section is not intended to be a voluminous history of a program but rather a concise paragraph outlining key points, which will be of value to prospective subcontractors in making their proposals.

This is especially applicable for fabrication statements of work, as this section will normally be very brief; however, R&D effort may require a more lengthy treatment of introductory material and background information.

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6.2.2 Section 2 – Scope

This section provides an overall picture of the total procurement in concise form. The scope will indicate the various phases (design, develop, fabricate, test, and delivery) of the effort, and tie down the overall limits in terms of specific technical results, time; and any special provisions or limitations. Overall scope must be consistent with the detailed language in Sections 4 and 5.

6.2.3 Section 3 - Applicable Documents and/or Specifications and or Definitions

Quite often a procurement is controlled in some way by previous documentation which might detail earlier efforts, indicate the current state of a problem area, establish background in a technical discipline, and the like. The prospective subcontractor must be cognizant of these documents in order to propose realistically on the work and successfully accomplish it. For this reason, it is of importance, both to the Buyer and the subcontractor, that these documents be listed. Similarly, there are often specifications to which the contractor should adhere in accomplishing the prescribed tasks. These specifications relate to the technical requirements, and should be listed so that the prospective subcontractor understands all constraints under which he must perform. As previously stated, the SOW is a detailed description of responsibilities under a contract, whereas a specification is a description of the parameters of the end result to be achieved. This section ties the specifications to the work statement to allow the prospective contractor the opportunity to understand the relationship between the two documents. This understanding ensures a more complete response to the solicitation. It should be noted that any such listing in this paragraph is for information only and is not contractually obligatory. All contractually applicable documents must be cited in the text of the appropriate task in Section 4. If there are no applicable reports or specifications, a comment to this effect should be made.

6.2.4 Section 4 - Technical Tasks and Quality Assurance

This section defines the work to be accomplished in terms of specific steps or tasks and sets forth the Quality Assurance Requirements. Here, the subcontractor will find a detailed description of exactly what must be done to successfully fulfill obligations under the contract. Further, NASA's responsibilities must be cited so that the subcontractor can fully understand what can be expected of NASA in accomplishing the required end result. Tasks are generally introduced by action verbs (e.g., study, design, develop, test, evaluate, inspect, verify, etc.), leaving no question as to the task requirement.

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It is also in this section that contractual commitment is made (e.g., “the contractor shall...”, “NASA shall...”).

When the burden of definition of the effort (particularly in R&D) must be placed on the prospective subcontractor, clearly impose the requirement in a manner so that the subcontractor understands that this definition must be provided in the proposal (if this is needed) or later on in the contractual program (if this is the intent). Similarly, any requirement concerning anticipated experimental or installation environments, specialized scientific or technical personnel, unique or unusual verification techniques, or other resources should be delineated. When the prospective subcontractor is required to incorporate definitions or plans, including Quality Assurance Plans, it should be stipulated that these are subject to NASA approval.

This section should indicate any desired approach to the solution of a problem whenever one or more methods of approach might be followed. If no specific approach is warranted and/or will be determined on the basis of the selected subcontractor's technical proposal, this should be mentioned.

6.2.5 Section 5 - Reports Data, and Deliverables

The purpose of this section is to establish exactly what the supplier is to deliver, including technical reports, manuals, technical data, and the like. Subcontract data and reporting requirements are separate documents and should not be duplicated in the SOW.

6.2.6 Section 6 - Other Special Considerations.

This is a section set aside to reflect and detail any special interrelationships between NASA and subcontractor. For example, the use of Government furnished or loaned property might be cited; or special safety requirements may be indicated. Any other specific directions relative to technical work (not administrative matters) for the subcontractor to follow should be included here. This paragraph might also provide instructions to the subcontractor relative to the possible utilization of NASA expertise.

6.3 Procedure

- 6.3.1 The SOW writer shall, as a first step in preparation, break the total requirement into realistic work packages and list them in a matrix diagram (see paragraph 2.0). The work package matrix does not become a part of the procurement package, but should be retained to assist in evaluation of proposals.

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- 6.3.2 Using the work package matrix as a guide, the writer shall establish a milestone schedule for accomplishing the requirement (see paragraph 3.0). The milestone schedule does not become a part of a procurement package, but should be retained to assist in proposal evaluation.
- 6.3.3 The writer shall establish an independent cost estimate for budgetary purposes for each work package (see paragraph 4.0). When possible, the writer shall make labor-loading estimates for each technical task in the total effort. Labor-loading estimates do not become a part of the procurement package, but should be retained to assist in proposal evaluation.
- 6.3.4 The writer shall develop a complete statement of work per paragraph 6.0, above. In preparing the SOW, the writer shall ensure that:
- Clear and concise task statements are generated which will be understandable not only to technical people, but also to lawyers, buyers, financial, and administrative personnel.
 - All obligations and responsibilities are specifically delineated.
 - The prospective subcontractor is not relieved of responsibility because of ambiguous verbiage.
 - Technical tasks are written in active, not passive, language (i.e., “The subcontractor shall perform...;” not “Performance shall occur...”).
 - NASA rights have been protected through use of “review and approval” of tasks.
 - All extraneous instructional and administrative material has been deleted.
 - Necessary references and citations have been included in the proper place.
- 6.3.5 Work statements shall be reviewed and approved by Task Manager, BS/TSS Manager, Safety/Quality & Environmental Manager, NASA, prior to final submission to Purchasing as part of a purchase requisition. Should it be necessary to revise a work statement at any time during the Procurement Process, the requestor shall obtain the necessary review and approvals and inform Purchasing in writing as to the required change.

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6.4 Format

6.4.1 The SOW shall be typed on plain white paper. The cover page shall carry the legend:

Statement of Work Document No.
Plum Brook Station
Sandusky, Ohio

centered at the top. In the center of the cover page, the document shall be identified as follows:

STATEMENT OF WORK
FOR

DATE

The lower section shall contain approval information as follows:

Prepared by _____ Date _____
Originator

Approved by _____ Date _____
Task Manager

Approved by _____ Date _____
BS/TSS Manager

Reviewed by _____ Date _____
Manager, Safety/Quality & Environmental

Concurred by _____ Date _____
NASA Manager

Approved by _____ Date _____
Purchasing Manager

Filed by _____ Date _____
Records Office

6.4.2 Each section of the work statement shall be numbered with an Arabic numeral. Each subsection and paragraph thereunder shall be identified as follows:

1.0 SECTION TITLE
1.1 Subsection
1.1.1 Paragraph
1.1.1.1 Subparagraph

6.4.3 Section headings shall be completely capitalized and underlined. Subsection headings shall be capitalized and underlined. Paragraph and subparagraph headings shall be capitalized.

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6.5 Language Style

6.5.1 The paramount consideration in the SOW is its ability to communicate, and this requires language free of vague and ambiguous terms and the use of the simplest words and phrases that will convey the intended meaning. Inclusion of essential information shall be complete, whether by direct statements or reference to other documents.

Consistency in terminology and organization of material will contribute to the SOW's clarity and usefulness. Sentences shall be short and as concise as possible. Punctuation should aid in reading and prevent misreading. Well-planned word order requires a minimum of punctuation. When extensive punctuation is necessary for clarity, the sentence(s) shall be rewritten. Sentences with compound clauses shall be converted into short and concise separate sentences.

6.5.2 The only abbreviations employed shall be those in common usage and not subject to misinterpretation. The first time an abbreviation is used in the text, it shall be placed in parentheses and shall be preceded by the word or spelled out in full; e.g., pounds per square inch (psi).

6.5.3 Trade names, copyrighted names, or other proprietary names applying exclusively to the product of one company shall not be used unless the item(s) cannot be adequately described because of the technicality involved, construction, or composition. In such instances, one and, if possible, several commercial products may be included, followed by the words "or equal" to ensure wider competition and that bidding will not be limited to a particular make specified. The same guidance applies to manufacturers' part numbers or drawing numbers for minor parts when it is impracticable to specify the exact requirements. In such cases, the particular characteristics (salient features) required shall be included to define "or equal."

6.5.4 Certain words and phrases are frequently used in a work statement. The following rules shall be followed:

- Referenced documents shall be cited thus: "conforming to...", "as specified in...", or "in accordance with..." .

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- “Unless otherwise specified” shall be used to indicate an alternative course of action. The phrase shall always come at the beginning of the sentence and, if possible, at the beginning of the paragraph. This phrase shall be used only when it is possible to clarify its meaning by providing a reference.
- When making reference to a requirement in the specification and the requirement referenced is rather obvious or not difficult to locate, the simple phrase “as specified herein” is sufficient and shall be used.
- The phrase “. . . to determine compliance with . . .”, or “. . . to determine conformance to . . .” shall be used in place of “. . . to determine compliance to . . .” In any case, use the same wording throughout.
- The emphatic form of verb shall be used throughout the SOW; that is, state in the Technical Task Section that “The indicator shall be designed to indicate...”
- Use “shall” whenever the SOW expresses a provision that is binding. Use “should” and “may” whenever it is necessary to express nonmandatory provisions. "Will" may be used to express a declaration of purpose on the part of NASA. It may be necessary to use "will" in cases where simple futurity is required (i.e., power for the motor will be supplied by batteries).
- Avoid language with imprecise meaning. Do not use “and/or,” “first-class workmanship,” “in accordance with standard practice,” and the like. NASA jargon is to be avoided.

7.0 Statement of Work Checklist

7.1 The following checklist for work statements provides some of the considerations, which the writer must bear in mind. This checklist is not complete, but should be used as a guide for the writer to review the quality of this effort.

Is the SOW sufficiently specific to permit the writer and the subcontractor to make a list of manpower and resources needed to accomplish each technical task?

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Are specific duties of the subcontractor stated in such a way that requirements are known, and can the technical representative who signs the acceptance report tell whether the subcontractor has complied?

Is the requirement overspecified? The ideal situation is to specify results required and let the winning subcontractor find the best method of achieving the desired results.

Has the work been organized properly into tasks? These are essential in evaluating the proposal and during performance may be used for control.

Have the elements of quality assurance been fully considered for the total life of the procurement? Quality assurance provisions for hardware and software must be included for all procurements.

Is general information separated from tasks so that background information, suggested procedures, and the like are clearly distinguishable from contractor responsibilities?

Is there a date for each item the subcontractor is to do or deliver? If elapsed time is used, does it specify calendar days or work days?

Have the headings been checked for format and grammatical usage? Are subheadings comparable? Is the text compatible with the title?

Does the SOW include only such reports and documentation as are really needed for (1) control; (2) documentation of technical results; and (3) follow-on procurements?

Are all obligations of NASA carefully delineated? If Government property is to be provided, has the nature, condition, and availability of the equipment been stated. If approval actions are to be made by NASA, have they been specified and have there been provisions for a time limit? Remember that any provision, which takes control of the work away from the subcontractor, even temporarily, must be covered by a contingency reserve if the subcontractor is to protect himself.

Have all loopholes been closed? Subcontractors and inspectors adhere literally to the SOW. The subcontractor may refuse to do something that is only referred to, desired, or implied as a goal.

Is the requirement completely described? To be legal and binding, an agreement must be complete. Not only for reasons of legality, but for every practical application, it is necessary that the details be complete. Specify “when” and “where” as well as “what.”

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Since they generally result in either an expensive disagreement or in a windfall to the subcontractor, have all "catchall" statements been eliminated?

Does the SOW provide for a sole source to do the work? The SOW specifies a requirement of NASA and is supposedly impartial concerning who can do it. In keeping with this philosophy, the work statement itself should contain no reference to sources or proprietary talent.