



GROUND OPERATIONS OPERATING PROCEDURE

TITLE: ENGINEERING SUPPORT REQUEST (ESR)

No.: USA004610

Rev.: 4

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POLICYMAKER: OPERATIONS' REQUIREMENTS AND TEST

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1. PURPOSE AND SCOPE

This procedure establishes the responsibilities and requirements for preparation and processing of ESRs.

2. APPLICABILITY

This procedure is applicable to Ground Operations (GO).

3. REQUIREMENTS

a. Generally, an ESR is to be prepared to request:

1. An initial requirement for configuration controlled end items for Space Shuttle ground support facilities, systems, equipment, and/or specific Flight Element (FE) Ground Support Equipment (GSE)

2. A change to configuration controlled:

a) End items for facilities, systems, equipment, and/or specific FE GSE

b) Facilities, systems, and/or equipment for which the Space Program Operations Contractor (SPOC) has sustaining engineering responsibility

c) Facilities, systems, and/or equipment for which the NASA Kennedy Space Center (KSC) Engineering Directorate (NE) has design responsibility

d) FE GSE for which the SPOC subcontractor has design responsibility

e) Launch Processing System (LPS) hardware and/or software

f) Facilities, systems, and/or equipment for which the Joint Base Operations Support Contractor (J-BOSC) has design and implementation responsibility

3. Excessing of a configuration controlled end item (Reference Operating Procedure (OP) USA004607.)

4. Transfer of equipment to or from United Space Alliance (USA) property accountability (Reference OP USA004607.)

5. GSE additions to the baseline (Reference OP USA004607.)

b. An ESR initiated for FE GSE becomes a backup document to a Space Shuttle Program (SSP) Change Request (CR) upon determination that an SSP Interface Control Document (ICD) or Operations and Maintenance Requirements and Specifications Document (OMRSD) requirement is affected.

- c. ESRs approved by Ground System Working Teams (GSWTs) are to be reviewed by Mission Assurance and Environmental Management Florida.
- d. For Integrated Data Systems (IDS), an SPOC initiated ESR number is to be issued only after the responsible GSWT lead has approved the ESR and submitted it to the IDS Configuration Control Board (CCB) or IDS CCB representative for processing.
- e. For SPOC initiated Ground System (GS) ESRs, the ESR number is issued upon receipt by Ground Project Management's Change Integration (CI), and then the ESR is forwarded to the applicable GSWT.
- f. ESRs that originate external to SPOC and require SPOC action are to be submitted to CI. The KSC ESR form is acceptable for non-USA originators.
- g. Category 1P ESRs initiated by the International Space Station (ISS) Integrated Product Team (IPT) do not require processing to the Ground Review Board (GRB) for modification category validation.
Note: GRB membership consists of the SPOC GO and NASA KSC NE chief engineers.
- h. The IDS director is to act as the GRB for Category 1 changes for which the IDS CCB is the responsible CCB. Presentation to the formal GRB is not required.
- i. SPOC initiated ESRs are to be processed and forwarded to the GS CCB or IDS CCB, as applicable.
- j. A proposed configuration change can be cancelled or withdrawn only by the originator or GSWT lead prior to a CCB disposition.
- k. ESR changes that necessitate a change to the Program Model Number (PMN) baseline are to be distributed with an authorizing Configuration Control Board Directive (CCBD) for baseline maintenance.
- l. ESRs are to have a modification category identified in accordance with Appendix A, block 10, instructions.
Note: Modification categories are not to be confused with criticality categories identified in NSTS 22206.
- m. ESRs validated as Category 1S or 2S or 1E or 2E can be recategorized only by Mission Assurance or Environmental Management Florida, respectively.
- n. For IDS, assessment of ESR scope is to be recorded on an Engineering Assessment (EA). For GS ESRs, the GSWT supplies the Ground Operations Supportability Report (GOSR), unless deemed unnecessary by the GS CCB chairperson.
- o. Prior to submittal to the applicable CCB, Category 1 ESRs are to have the effectivity and milestone in blocks 7 and 9. Category 1 GS ESRs must be validated by the GRB. (Reference Appendix A.)

Once an ESR is validated as a mandatory requirement, a change in the effectivity or modification category must be approved by the GRB prior to processing to the GS CCB or IDS CCB. For a Category 1S or 1E requirement, the Mission Assurance or Environmental Management Florida manager (or designee), respectively, also must approve the change. For a Category 1P requirement, the Orbiter Operations director (or designee) also must approve the change.

- p. An SPOC initiated ESR to change a J-BOSC facility, system, and/or equipment requires the ESR originator and GSWT's signatures, Mission Assurance and Environmental Management Florida review, and an ESR number assigned by the CI change controller. Then, the ESR is processed to J-BOSC Work Control for processing for design and implementation.
- q. SPOC generated ESRs are to have risk management summaries submitted with them. For GS, block 15 of the USA ESR form must be completed. For IDS, the SPOC Risk Assessment form must be submitted with the ESR, along with a Cost Justification/Avoidance letter. The Cost Justification/Avoidance letter has no predefined format, but must summarize any tangible or intangible savings or mitigations that result from the change request.
- r. The original ESR can be changed by the originator, GSWT lead, Ground Project Management's CCB/Analysis Support, or the CCB chairperson use of red ink. The change must be signed and dated legibly.
- s. A copy of every ESR received by CI is sent to the both the USA chief engineer and Process Review Team (PRT).

4. RESPONSIBILITIES

Not applicable (N/A)

5. PROCEDURE

5.1 ESR ORIGINATORS

- a. Enter the requested information on the ESR (reference Appendix A), except for the ESR number.
- b. For risk assessment:
 - 1. For GS, submit the ESR, with risk management score noted in block 15, to CI.
Note: If the risk management score is not annotated, Ground Project Management's Ground Requirements/CCB Chair will perform an assessment and document it on the SPOC Risk Assessment form.
 - 2. For IDS, augment block 15 by performing a risk assessment, documenting results on the SPOC Risk Assessment form, available through the USA Risk Management Website. Instructions for performing the assessments, as well as logging the assessment into the risk management database, exist there. Attach a copy of the completed SPOC Risk Assessment to the ESR and

submit to the GSWT lead for approval. The IDS CCB chairperson (or designee) acts as the GSWT lead, reviewing and signing ESRs.

- c. Obtain the applicable NASA counterpart signature.
- d. Support the proposed change, as required, during assessment, review, and disposition activities.
- e. To cancel an ESR for GS changes, draw a diagonal line across the original ESR, write "Cancelled" along the line, sign, and date. Send the cancelled ESR to CI.

5.2 GSWT'S SUPPORTING THE GS CCB

- a. Evaluate ESRs for their system and either approve or disapprove. (Reference OP USA000494.) Enter the ESR into the Ground Operations Supportability (GOS) database. Write the GOS database number on the ESR, load the K number in the GOS database, print the GOSR, and attach it to the ESR.
- b. If an ESR is disapproved, return it to CI, stating the reason(s) for rejection.
- c. If an ESR is approved, have the SPOC GSWT lead sign (with "GSWT" and the team title after his or her name) to indicate the team's agreement with the justification criteria, operational need, mission, effectivity, and modification. Obtain the NASA GSWT system engineer's signature for critical items as identified in TR-1287.
- d. For GS, enter the Ground Systems Support (GSS) identification number and verify or complete requester input. Prepare a Rough Order of Magnitude (ROM) cost estimate, except for documentation only, GSE identification, excess, and property transfers. Prepare the ROM estimate as follows:
 1. Labor hours for:
 - a) Design
 - b) Fabrication and/or installation
 - c) Software
 2. Nonlabor costs for:
 - a) Material and spares
 - b) Fixed Price Contractor (FPC)

5.3 GRB

- a. Validate proposed SPOC initiated Category 1 ESRs (except those for which ISS, a payload organization, or the IDS CCB has responsibility) in ESR block 10 prior to submittal to the applicable CCB to ensure strict compliance with justification criteria.
- b. For Category 1S or 1E requirements (as evaluated by Mission Assurance or Environmental Management Florida, respectively) with interim controls in place, establish and validate User Need Date (UND), effectivity, and milestone. (Reference Appendix A, blocks 3, 7, and 9.)

- c. If opposed to the proposed change, or if the change lacks justification, downgrade the category (except for Category 1S or 1E ESRs); or, request that the GSWT lead and/or originator supply additional information and/or justification.
- d. Disposition Category 1 ESRs with completed signature requirements and stamped disposition indication.

5.4 GROUND PROJECT MANAGEMENT

- a. Support the GRB, as required.
- b. Evaluate and process ESRs for CCB disposition.

5.5 CHANGE CONTROLLERS

- a. Assign configuration change proposal tracking numbers in accordance with OPs USA004621 (for GS CCB operations) and USA004623 (for IDS CCB operations).
- b. Enter the applicable data into their configuration management tracking system.
- c. Submit original ESRs to Mission Assurance for performance of safety and environmental reviews. Schedule only IDS ESRs for the IDS Change Screening Panel.
- d. Notify the ESR originator and GSWT of ESR number assignment.
- e. If the GOSR is not attached, notify the GSWT that it must be submitted for GS CCB requirements, unless waived by the chairperson.
- f. Send copies of every ESR to the USA chief engineer and PRT.

5.6 MISSION ASSURANCE

- a. Receive ESRs from the applicable change controllers and forward them to Environmental Management Florida for an environmental assessment.
- b. Review and categorize ESRs with one of the following modification category classifications:
 - 1. Category 1S
 - 2. Category 2S
 - 3. No safety impact
- c. Stamp the ESR with the applicable safety categorization.
- d. For ESRs determined to be Category 1S or 2S, perform the following:
 - 1. Prepare a safety risk assessment to include controls, as required.
 - 2. Track the ESR to closure or until Category 2S conditions are abated.
 - 3. Validate or correct the safety categorization (block 10).
 - 4. Attach the safety assessment to the ESR.
- e. For ESRs determined to be Category 1S, support the GRB, as required.
- f. Return the ESR to the applicable change controller for follow-on processing.

- g. Enter the applicable data (date the ESR was received and returned) into their configuration management tracking system.

5.7 ENVIRONMENTAL MANAGEMENT FLORIDA

- a. Receive ESRs from Mission Assurance.
- b. Review ESRs and perform an environmental assessment that identifies the environmental impacts associated with the ESR.
- c. Categorize ESRs and stamp with the applicable modification category classification, as follows:
 - 1. Category 1E
 - 2. Category 2E
 - 3. Category PE (potential environmental impact)
 - 4. No environmental impact
- d. Return stamped ESRs to Mission Assurance with justification for 1E, 2E, and PE categories.
- e. Identify environmental requirements and act as the SPOC focal point for obtaining or updating environmental permits or addressing other environmental issues related to the ESR.
- f. As required, coordinate with the originator, GSWT, design engineering organization, and J-BOSC to ensure that environmental issues related to the ESR are mitigated.

5.8 CCB'S

- a. Screen ESRs for justification, clarity, scope, and completeness.
- b. Determine if requests are within scope and then disposition them in accordance with OP USA004621 or USA004623.

5.9 GO BUSINESS AND RESOURCE MANAGEMENT

- a. Track nonlabor modification budget.
- b. Provide resolution on fund source issues.

6. DEFINITIONS

(Also reference USA004783.)

Disposition. For this procedure, the act of deferral, transfer, approval, or disapproval of an ESR by a CCB chairperson or cancellation of an ESR by the requester, requester's director, and/or GSWT

7. REFERENCES

NSTS 08171, Space Shuttle Operations and Maintenance Requirements and Specifications Document (OMRSD)

NSTS 22206, Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

OP USA000494, Ground System Working Team and Supportability Process

OP USA004607, Equipment Under GS CCB Authority and SRB Element GSE Excess Process

OP USA004621, Ground Systems Configuration Control Board Operations

OP USA004623, Integrated Data Systems Configuration Control Board Operations

TR-1287, With Remarks, KSC Support Equipment List by Model Number (CMD5/CID)

USA004783, Definitions

8. FORMS

<u>Form Number</u>	<u>Title</u>	<u>Location</u>
USA 40-001	Configuration Control Board Directive (CCBD)	USA E-Forms
USA 40-068 or KSC 21-146	Engineering Assessment (EA)	USA E-Forms or NASA KSC Forms
USA 40-051 or KSC 21-319	Engineering Support Request (ESR)	USA E-Forms or NASA KSC Forms
KSC 2-122 NS	John F. Kennedy Space Center Configuration Control Board Directive (CCBD)	NASA KSC Forms
KSC 2-131	KSC Document Continuation Sheet - Generic	NASA KSC Forms
KSC 2-152V3	Nonconformance/Problem Report (PRACA); used for Interim Problem Reports (IPRs), Problem Reports (PRs), and Discrepancy Reports (DRs)	NASA KSC Forms
PRB U500342	SPOC Operations Risk Assessment Scorecard	USA home page, RATS* icon, Risk Management, and Scorecards
SPOC 9610	SPOC Risk Assessment	USA home page, RATS icon, Risk Management
SSP 4000A/B	Space Shuttle Program Change Request (CR)	SSP configuration management forms at: http://sspweb.jsc.nasa.gov/webdata/pdcweb/sspforms-2000.htm
N/A	TOP/WAD* Deviation (called "Deviation")	System generated

* RATS = Risk Associated Trouble Spots; TOP = Technical Operating Procedure; WAD = Work Authorization Document

**APPENDIX A
ENGINEERING SUPPORT REQUEST (ESR)
(USA 40-051; REV 2-04)**

- a. This appendix contains detailed instructions for completing the ESR. For SPOC initiated ESRs, these instructions supersede those accompanying the ESR form.
- b. Completion of all blocks on the form, except 4, 25, and 26, is the responsibility of the originator. To ensure correct and timely processing and preclude nonproductive effort, the information entered on the ESR is to be thorough, concise, and accurate. (ESRs not prepared correctly are returned to the originator, or the ESR is updated and/or corrected upon coordination with the originator.)
- c. If the information requested is not applicable to the proposed change, enter "N/A."
- d. All blocks on the form must have an entry.
- e. Additional documentation or backup data can be attached to the ESR. Ensure that the total number of sheets in ESR block 5 reflects attachments.

BLOCK ENTRY DESCRIPTION

- | | |
|---|---|
| 1 | Title of work to be accomplished |
| 2 | Date ESR is written |
| 3 | Required completion date |
| 4 | ESR number assigned by CI |
| 5 | Identify the number of sheets submitted with the ESR. Each sheet is to be marked with the number of the current page within the total number of pages; e.g., "1 of 9," "2 of 9," etc. |
| 6 | Identify the location of the work to be done; e.g., Vehicle Assembly Building (VAB), Pad A, etc. |
| 7 | For a Category 1 change, the GRB specifies an effectivity. If the Category 1S or 1E change does not affect vehicle and/or FE GSE processing, the entry can be "N/A."

Identify either flight or nonflight effectivity. Effectivity entries for flight and nonflight are as follows: <ol style="list-style-type: none"> a. For flight, the mission number; e.g., STS-205 (Indicate the first effectivity that the change is to support.) b. For nonflight, enter "NFLT." |

BLOCK ENTRY DESCRIPTION

- 8 Work is accomplishing a GSS identified project; e.g., No. 6745 from the GSS database.
- 9 Identify a certain milestone; e.g., roll to launch pad, STS-163 landing, etc.
- 10 The category indicates the urgency or priority of the requested action. The category assigned must be justified (block 22) with the mandatory requirement source cited, and it is to be validated during assessment of the ESR.

Categories for Space Shuttle processing changes are as follows:

1M - A mandatory change (deficiency correction or modification) without which the mission cannot be accomplished; or, as approved by the GRB

1P - A mandatory change (deficiency correction or modification) without which a payload requirement cannot be met

1S - A mandatory change for an imminent-danger safety issue for which acceptable interim controls and/or long-term workarounds do not exist and Mission Assurance's Safety Engineering assigned SPOC Operations Risk Assessment Scorecard numerical score is 16 or higher

Notes:

- a. "Imminent danger" implies that, if the change is not accomplished, one or more of the following will occur (or have a high probability of occurring):
1. Death or permanent disability
 2. Multiple serious injuries
 3. Multiple hospitalizations
 4. Citation for a Serious (or worse) violation of Federal safety regulations
 5. Loss of critical or essential element(s)
- b. "Acceptable interim controls" or "long-term workarounds" meet the following conditions:
1. Reduce safety risk to a level accepted by Mission Assurance, personnel performing the work, and management
 2. Are acceptable for use over a long period of time (1 year or more or two work cycles)
 3. Eliminate the probability of a citation for violation of a Federal safety regulation

BLOCK ENTRY DESCRIPTION

4. Are documented and verifiable and cannot be eliminated by a Deviation without Mission Assurance concurrence

2 - A highly desirable change that decreases total life cycle costs or serial flow time, improves system reliability, or involves changes to engineering documentation only

2S - A highly desirable change for a safety issue that does not meet the Category 1S criteria or is an imminent-danger safety issue mitigated by implemented, acceptable interim controls or a long-term workaround and has a Safety Engineering assigned SPOC Operations Risk Assessment Scorecard numerical score of 8 to 15

1E - A change without which the facilities, systems, and/or equipment essential to launch and landing processing support would not be in compliance with environmental regulations, possibly resulting in serious environmental damage and civil and/or criminal liability (There are no acceptable workarounds.)

2E - A change not covered by Category 1E above and that, left undone, could result in violation of existing environmental statutes or codes

PE - A change not required to achieve environmental compliance, but implementation of which could require notification of and approval by regulatory agencies

- 11 Identify related documents or initiative to be tracked in support of work; e.g., RATS, Risk Radar, Lean Six Sigma (L6S), etc.
- 12 Enter "N/A."
- 13 Identify the equipment PMN from TR-1287.
- 14 Identify the GSWT responsible for the equipment being worked on (not necessarily the GSWT submitting the request).
- 15 Identify the risk score of the current state or condition using the SPOC Operations Risk Assessment Scorecard.
- 16 Identify the ROM and ROM estimated cost to accomplish the work. For IDS, the estimates are performed after an ESR is entered into the system, so "N/A" is to be entered.
- 17 Identify the equipment affected by the work.

BLOCK ENTRY DESCRIPTION

- 18 Identify the system or systems affected by the work. For IDS, this aligns with work breakdown structure, such as: Math Models, SGOS, APPSW, CCMS SW/HW, RPS SW/HW, SDC SW/HW, PCG2 SW/HW, etc. Multiple entries are possible.
- 19 Provide a concise description of the work to be performed.
- 20 Stamp and sign off supporting work, as required; e.g., safety and environmental engineering stamps.
- 21 Describe action necessary to accomplish the work requested.
- 22
- a. Provide a detailed justification of the request when the request is:
 1. In response to a specific requirement; e.g., program requirements documents (PRDs)
 2. To solve a problem or provide enhancement; e.g., PR, Incident Prevention Board (IPB) item, processing enhancement, etc.
 - b. Reference the impelling ("driver") documentation.
 - c. Include the program and/or schedule impact if the request is not implemented.
 - d. Furnish rationale that justifies clearly the modification category assigned (block 10), as follows:

1M - Mission Mandatory. Cite the program requirement, if applicable. If it is a make-it-work change, describe the requirement that cannot be met and/or event that cannot occur and the reason.

1P - Payload Mandatory. Same as for 1M, above.

1S - Safety Mandatory. For GS, "Safety items must be cleared by _____ (the assigned effectivity in block 7 and/or the milestone in block 9) to prevent _____ (loss of life, severe injury, or damage to flight hardware)." "Safety Category 1S" stamp is required.

2 - Highly Desirable. For GS, provide a labor and material ROM cost estimate and show cost savings and/or payback. If it is a make-it-work change, describe the consequences of offline work stoppage or eliminating a temporary online workaround.

2S - Safety Highly Desirable. For safety requirements not mission related, cite the code, specification, and/or standard violation or condition. "Safety

BLOCK ENTRY DESCRIPTION

Category 2S" stamp is required.

1E - Environmental. Describe how these items are to be cleared up by the assigned effectivity (block 7) and/or milestone (block 9). "Environmental Category 1E" stamp is required.

2E - Environmental. Describe how these items, such as pollution prevention, are not driven by regulatory deadlines or noncompliances. "Environmental Category 2E" stamp is required.

PE - Potential Environmental. Describe how these items could require regulatory agency notification and approval (state which agency) prior to implementation. "Environmental Category PE" stamp is required.

- 23 Identify additional pertinent information to support the work.
- 24 Identify the name, organization, and telephone number of the requester (or technical contact, if different) and obtain that individual's signature.
- 25 Identify the name and organization of the approving person and the date. Obtain the signature of the approving person, if required. For IDS, the first- or second-line manager signs.
- 26 Identify the name and organization of any additional person whose approval is required and the date. Obtain additional signatures, if required. For IDS, the GSWT signature is required.

CHANGE HISTORY

REV	EFFECTIVE DATE	DESCRIPTION
4	05/10/07	Annual update. Changes the OP policymaker. Process change: updates processes at 3.f, r, and s and 5.5.f. Updates organizations, references, forms, OP format, and SFOC to SPOC.
3	01/18/06	Updates procedures. Deletes reference to in/out of family to align with PRCBD 062459A requirements. Updates references and forms.
2	04/12/05	Clarified IDS requirements for processing ESRs and updated forms.
1	10/18/04	Annual update. Updated organizations, references, and forms. Deleted CLCS. Updated to current operations and included the new USA ESR form.
Basic	09/19/02	Superseded SPI BM-310(2)K. Included updated forms and reference documents.