

# **Geostationary Operational Environmental Satellite (GOES)**

## **GOES-R Series**

### **PAYLOAD RESOURCE ALLOCATION DOCUMENT (PRAD)**

**January 14, 2008**



National Aeronautics and  
Space Administration

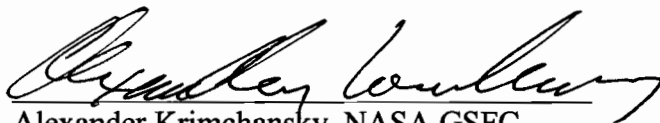
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417-R-RAD-0061

**Geostationary Operational Environmental Satellites (GOES)  
GOES-R Series  
Payload Resource Allocation Document**

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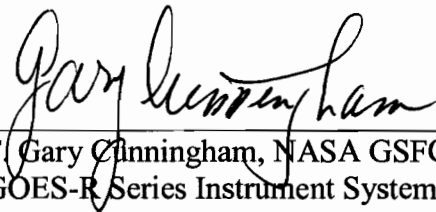


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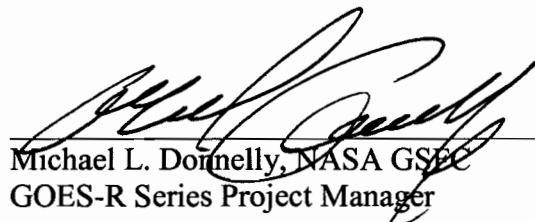


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### **PRAD**

417-R-RAD-0061, RM Version, Payload Resource Allocation Document

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ID	Object Number	417-R-RAD-0061, RM Version, Payload Resource Allocation Document
PRAD 1	1	<b>1 Scope</b>
PRAD 2	1.0-1	This document defines the instrument resource allocation for the GOES-R satellite. The resources covered by this document are: mass, power, image navigation and registration (INR), pointing, and disturbance requirements. Resource allocations for the magnetometer instrument and Auxiliary Communication Services are not included since they are provided by the spacecraft contractor and are part of the spacecraft resource budget.

<b>ID</b>	<b>Object Number</b>	<b>417-R-RAD-0061, RM Version, Payload Resource Allocation Document</b>
PRAD 3	2	<b>2 Documents</b>
PRAD 4	2.1	<b>2.1 Applicable Documents</b>
PRAD 5	2.1.0-1	<p>The latest approved versions of the following documents are applicable to this document.</p> <ol style="list-style-type: none"><li>1. GOES-R General Interface Requirements Document (GIRD), 417-R-GIRD-0009</li><li>2. ABI Unique Instrument Interface Document (UIID), 417-R-ABIUIID-0010</li><li>3. GLM Unique Instrument Interface Document (UIID), 417-R-GLMUIID-0058</li><li>4. SUVI Unique Instrument Interface Document (UIID), 417-R-SUVIUIID-0112</li><li>5. EXIS Unique Instrument Interface Document (UIID), 417-R-EXISUIID-0117</li><li>6. SEISS Unique Instrument Interface Document (UIID), 417-R-SEISSUIID-0031</li><li>7. Reserve</li><li>8. GOES-R Series Mission Requirements Document (MRD), P417-R-MRD-0070</li><li>9. ABI Performance and Operational Requirements Documents (PORD), 417-R-ABIPORD-0017</li><li>10. SUVI Performance and Operational Requirements Documents (PORD), 417-R-SUVIPORD-0111</li><li>11. EXIS Performance and Operational Requirements Documents (PORD), 417-R-EXISPORD-0116</li><li>12. SEISS Performance and Operational Requirements Documents (PORD), 417-R-SEISSPORD-0030</li><li>13. GLM Performance Operational Requirements Documents (PORD), 417-R-GLMPORD-0057</li></ol>

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PRAD 3 6	3	<b>3 Overview</b>
PRAD 3.0-1 7	3.0-1	<p>This document describes the approach for margin management of mass, power, image navigation and registration (INR) and interface disturbance requirements being used for GOES-R. While mass and power are self-explanatory, INR requirements are elaborated below.</p> <p>INR is a set of end-to-end, system-level performance requirements that apply to the Level-1b instrument data for the Advanced Baseline Imager (ABI). Level-1b data is defined to be radiometrically calibrated and geolocated data. Other instruments may have only certain aspects of INR requirements.</p> <p>INR requirements include: navigation, within frame registration (line-to-line and pixel-to-pixel), frame to frame registration, and channel to channel registration.</p> <p>The government holds a percentage reserve from the end-to-end INR requirements that appear in the Mission Requirements Document (MRD) and allocates the remainder to the instruments in the Performance and Operational Requirements Documents (PORs). The instrument contractors are responsible for meeting the end-to-end INR requirements in the PORs, given the spacecraft interface characteristics defined in the General Interface Requirements Document (GIRD). The instruments must meet the instrument disturbance requirements in the Unique Instrument Interface Document (UIIDs). The spacecraft must meet the interface requirements in the presence of the UIID instrument disturbances.</p> <p>The instrument contractors are not expected to maintain significant INR performance margin, since some of the INR requirements are very challenging, and the government is holding reserve. However, the contractors will have to rigorously justify all of their INR performance estimates.</p>

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PRAD 4  
8      **4 Instrument Mass Allocation**

PRAD 4.0-1  
9      The maximum mass allocation per instrument (including all contingency) **shall** be in accordance with the Instrument Mass Allocation Table below.

**Instrument Mass Allocation Table**

Instrument	Maximum Mass	Government Reserve		UIID Allocation
	kg	kg	%	kg
ABI	359	21	6%	338
Advanced Instrument	260	50	24%	210
GLM	100	35	54%	65
SUVI	81	13	19%	68
EXIS	35	6	21%	29
SEISS	84	21	33%	63

Note: % reserve is shown as % of UIID allocation.  
(CCR 01074) (CCR 01152)



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PRAD 5  
10      **5 Instrument Power Allocation**

PRAD 5.1  
11      **5.1 Average Power (Operational)**

PRAD 5.1.0-1  
12      The average operational power allocation, averaged over a 5 minute period including eclipse, per instrument (including all contingency) **shall** be in accordance with the Instrument Average Power (Operational) Allocation Table given below.

**Instrument Average Power (Operational) Allocation Table**

Instrument	Average Power (Operational)	Government Reserve		UIID Allocation
	W	W	%	W
ABI	563	113	25%	450
Advanced Instrument	481	96	25%	385
GLM	325	65	25%	260
SUVI	200	93	87%	107
EXIS	57	14	33%	43
SEISS	115	23	25%	92

Note: % reserve is shown as % of UIID allocation.  
(CCR 01135)

PRAD 5.2  
13      **5.2 Maximum Power (Operational)**

PRAD 5.2.0-1  
14      The maximum operational power allocation, power averaged over a 20 msec period per instrument (including all contingency) **shall** be in accordance with the Instrument Maximum Power (Operational) Allocation Table below.

**Instrument Maximum Power (Operational) Allocation Table**

Instrument	Maximum Power (Operational)	Government Reserve		UIID Allocation
	W	W	%	W
ABI	702	140	25%	562
Advanced Instrument	531	106	25%	425
GLM	407	82	25%	325
SUVI	280	135	93%	145
EXIS	69	14	25%	55
SEISS	125	25	25%	100

Note: % reserve is shown as % of UIID allocation.  
(CCR 01135)

PRAD 5.3  
15      **5.3 Average Power (Survival)**

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PRAD 5.3.0-1 The average survival power allocation, power averaged over a 72 minute period, per instrument  
16 (including all contingency) **shall** be in accordance with Instrument Average Power (Survival) Allocation Table below.

**Instrument Average Power (Survival) Allocation Table**

Instrument	Average Power (Survival)	Government Reserve		UIID Allocation
	W	W	%	W
ABI	195	25	15%	170
Advanced Instrument	144	29	25%	115
GLM	115	23	25%	92
SUVI	165	75	83%	90
EXIS	32	7	28%	25
SEISS	44	9	26%	35

Note: % reserve is shown as % of UIID allocation.

(CCR 01135)

PRAD 5.4  
17 **5.4 Maximum Power (Survival)**

PRAD 5.4.0-1 The maximum survival power allocation, power averaged over a 20 msec period, per instrument  
18 (including all contingency) **shall** be in accordance with Instrument Maximum Power (Survival) Allocation Table given below.

**Instrument Maximum Power (Survival) Allocation Table**

Instrument	Maximum Power (Survival)	Government Reserve		UIID Allocation
	W	W	%	W
ABI	282	37	15%	245
Advanced Instrument	200	40	25%	160
GLM	162	32	25%	130
SUVI	230	105	84%	125
EXIS	44	9	26%	35
SEISS	62	12	24%	50

Note: % reserve is shown as % of UIID allocation.

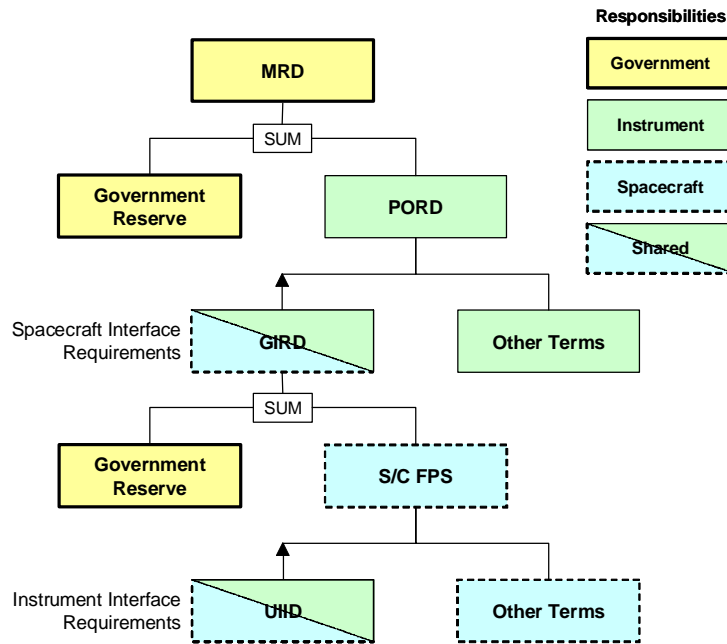
(CCR 01135)

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**PRAD 6 6 INR, Pointing, and Disturbance Requirements Allocation**  
19

**PRAD 6.0-1** The following figure shows the conceptual flow-down of INR and pointing requirements, including responsibilities for meeting the allocated requirements.  
20

**Top-Level INR Requirements Flow-Down**



Notes:

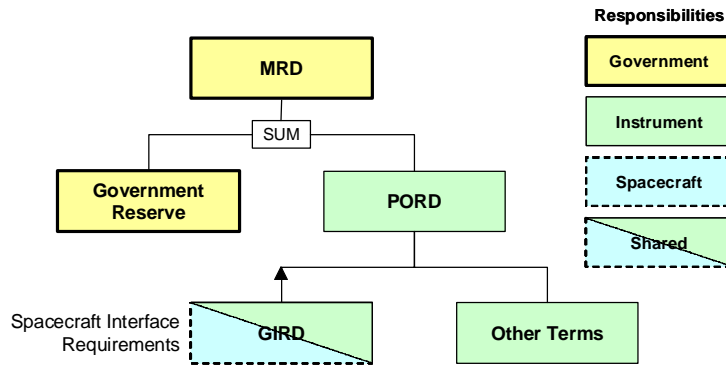
1. PORD reserve can be used for:
  - a) Instrument INR problems
  - b) Observatory problems
2. PORD reserve would only be needed for spacecraft problems if all of the GIRD reserve is exhausted.
3. GIRD reserve can be used to:
  - a) Increase allocation to observatory while UIID requirements are held constant
  - b) Increase UIID allocation(s) with corresponding observatory relief
  - c) Give instrument relief by decreasing GIRD levels
4. Uncertainties in GIRD-specified levels include:
  - a) Spacecraft model
  - b) Mission architecture
  - c) Validity of Root Sum Square (RSS) assumption used in making UIID allocations

**PRAD 6.1 6.1 Instrument INR and Pointing Requirements**  
21

**PRAD 6.1.0-1** The following figure shows the conceptual instrument INR and Pointing requirements flow-down.  
22

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PRAD 6.1.0-1 Instrument INR & Pointing Requirements Flow-Down  
22



PRAD 6.1.1 ABI INR Requirements Allocation  
23

PRAD 6.1.1.0-1 The instrument portion of the ABI INR requirement shall be in accordance with the ABI INR Allocations Table given below.  
24

**ABI INR Allocations Table**

INR Requirement	MRD		Government Reserve		PORD
	km @SSP	μrad	μrad	%	μrad
Navigation	1	28	7	25%	21
Navigation (eclipse)	1.5	42	10	24%	32
Frame-to-Frame Registration					
0.5-km & 1-km	21 μrad	21	5	24%	16
2-km	28 μrad	28	7	25%	21
Within-Frame Registration	1	28	7	25%	21
Line-to-Line Registration	0.25	7	1.8	26%	5.2
Co-registration					
2-km to 2-km	0.3	8.4	2.1	25%	6.3
2-km to 0.5-km	0.3	8.4	2.1	25%	6.3
2-km to 1-km	0.3	8.4	2.1	25%	6.3
1-km to 1-km	0.25	7	1.8	26%	5.2
1-km to 0.5-km	0.25	7	1.8	26%	5.2

**Notes:**

1. All INR requirements shown above apply to Level-1b data; that is, they are end-to-end.
2. All INR requirements are 3-sigma, East-West and North-South.
3. SSP = Sub Satellite Point (nadir)
4. Spacecraft does not get an explicit allocation of INR error, instead, it has to meet interface requirements.

PRAD 6.1.2 Reserve  
25

PRAD 6.1.3 GLM INR Requirements Allocation  
27

PRAD 6.1.3.0-1 The instrument portion of the GLM INR requirement allocation shall be in accordance with the GLM INR Allocations Table given below.  
28

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PRAD 6.1.3.0-  
28 1 **GLM INR Allocations Table**

INR Requirement	Units	MRD	Government Reserve		PORD
			Value	%	
Navigation	μrad	140	28	20%	112

PRAD 6.1.4  
29 **6.1.4 SUVI Pointing Requirements Allocation**

PRAD 6.1.4.0-  
30 1 The instrument portion of the SUVI pointing requirement allocation **shall** be in accordance with the SUVI Pointing Allocations Table given below.

**SUVI Pointing Allocations Table**

Pointing Requirement	Units	MRD	Government Reserve		PORD	UIID
			Value	%		
Pointing Accuracy 3σ N/S & E/W	arcmin	3	1.5	50%	-	1.5
Pointing Stability 3σ radial over any 60 sec	arcsec	6	0	0%	-	6
Pointing Knowledge 3σ radial	arcsec	2.5	0.0	0%	2.5	-

Notes:

1. Spacecraft does not get an explicit allocation of SUVI pointing error; instead, it has to point the SUVI sun sensor LOS to the specified pointing accuracy and stability values.
2. The pointing accuracy levied in the UIID is due to the limited ( $\pm 1.5$  arcmin) FOV of the SUVI sun sensor in each of the East-West and North-South directions, and the 42 arcmin square detector FOV.

PRAD 6.1.5  
31 **6.1.5 EXIS Pointing Requirements Allocation**

PRAD 6.1.5.0-  
32 1 The instrument portion of the EXIS pointing requirement allocation **shall** be in accordance with the EXIS Pointing Allocations Table given below.

**EXIS Pointing Allocations Table**

Requirement	Units	MRD	Government Reserve		PORD	UIID
			Value	%		
Spatial Coverage	arcmin	40	0	0%	40	-
Pointing Knowledge	arcmin	2	0.5	25%	-	1.5

PRAD 6.1.6  
33 **6.1.6 SEISS Pointing Requirement Allocation**

PRAD 6.1.6.0-  
34 1 There are currently no pointing requirements for the SEISS.

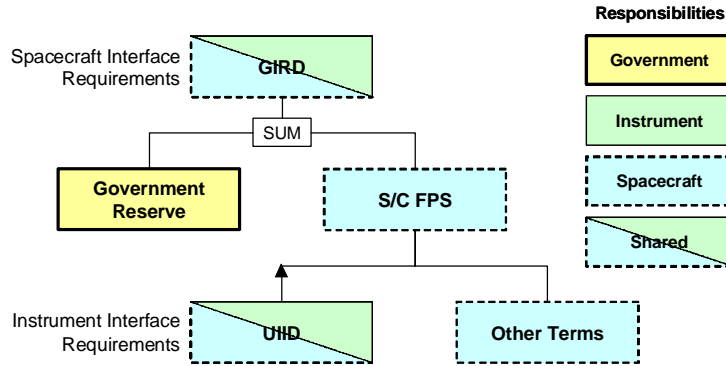
PRAD 6.2  
35 **6.2 Spacecraft Pointing and Disturbance Allocations**

PRAD 6.2.1  
36 **6.2.1 Nadir Pointing Instruments**

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PRAD 6.2.1.0-1 The following figure shows the flow-down of spacecraft interface requirements, including responsibility for meeting the nadir pointing instrument interface requirements.

**Interface Requirements Flow-Down**



PRAD 6.2.1.1 38 **6.2.1.1 Pointing Requirements**

PRAD 6.2.1.1.0 39 -1 The spacecraft interface pointing requirements for nadir pointing instruments **shall** be in accordance with the Pointing Requirements for Nadir-Pointing Instruments Table given below.

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PRAD 6.2.1.1.0  
39 -1

### Pointing Requirements for Nadir-Pointing Instruments Table

Requirement	Units	GIRD	Government Reserve		S/C FPS	ABI	Adv Instr	GLM	Other
			Value	%					
Attitude Error	$\mu\text{rad}$ 3-sigma, per axis	360	90	25%	270	N/A			
Attitude Stability	$\mu\text{rad}$ peak-to-peak, per axis, per 60 sec	500	200	40%	300	200	200	0	100
Attitude Rate Error (<15Hz)	$\mu\text{rad}/\text{sec}$ per axis	$\pm 100$ (Note 2)	$\pm 20$	20%	$\pm 80$	$\pm 20$	$\pm 15$	0	$\pm 76$
Attitude Knowledge Bias (pre-cal)	$\mu\text{rad}$ 3-sigma, per axis	1200	0	0%	1200	N/A			
Attitude Knowledge Diurnal	$\mu\text{rad}$ 3-sigma, per axis	45	0	0%	45	N/A			
Attitude Knowledge Dynamic	$\mu\text{rad}$ 3-sigma, per axis	30	0	0%	30	N/A			
Attitude Knowledge Error Stability 30 sec	$\mu\text{rad}$ not to exceed, per axis over any 30 second window	5	1	20%	4	N/A			
Attitude Knowledge Error Stability 300 sec	$\mu\text{rad}$ not to exceed, per axis over any 300 second window	10	2	20%	8	N/A			
Attitude Knowledge Error Stability 600 sec	$\mu\text{rad}$ not to exceed, per axis over any 600 second window	15	2	13%	13	N/A			
Attitude Knowledge Error Stability 900 sec	$\mu\text{rad}$ not to exceed, per axis over any 900 second window	19	2	11%	17	N/A			
Integrated Rate Error 1 sec	$\mu\text{rad}$ 3-sigma, per axis over any 1 sec window	1	0	0%	1	N/A			
Integrated Rate Error 30 sec	$\mu\text{rad}$ 3-sigma, per axis over any 30 sec window	2	0	0%	2	N/A			
Integrated Rate Error 300 sec	$\mu\text{rad}$ 3-sigma, per axis over any 300 sec window	7	0	0%	7	N/A			
Integrated Rate Error 900 sec	$\mu\text{rad}$ 3-sigma, per axis over any 900 sec window	20	1.5	8%	18.5	N/A			

#### Notes:

1. "Attitude Error" will have contributions from attitude knowledge, low-frequency control, and 0-peak stability (i.e., high-frequency jitter):

Error Term	Value ( $\mu\text{rad}$ , 3-sigma)	Source
Knowledge	60	S/C FPS
Control (low frequency)	60	Implicit
Stability (high frequency)	150	S/C FPS
<b>Sum</b>	<b>270</b>	<b>S/C FPS</b>
<b>Government Reserve</b>	<b>90</b>	<b>PRAD</b>
<b>Sum</b>	<b>360</b>	<b>GIRD</b>

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PRAD 39	6.2.1.1.0 -1	<p>2. Attitude rate error:</p> <p>a. GIRD level shown corresponds to absolute rate error limit of 100 <math>\mu</math>rad/sec and is provided for reference. Allowable level depends on total spacecraft gyro signal phase delay as per GIRD155. For a given GIRD level, reserve, and specified instrument allocations, the allocation to all other sources is computed using the following formula:</p> $\dot{\theta}_{S/C\ FPS} = \dot{\theta}_{GIRD} - \dot{\theta}_{Reserve}$ $\dot{\theta}_{Other} = \sqrt{\dot{\theta}_{S/C\ FPS}^2 - \dot{\theta}_{ABI}^2 - \dot{\theta}_{AdvInstr}^2 - \dot{\theta}_{GLM}^2}$ <p>b. GLM uncompensated angular momentum is limited to <math>\leq 0.001</math> N-m-sec, corresponding to an attitude rate error limit of <math>0 \leq \text{rad/sec}</math> when rounded to an integer value.</p> <p>3. Reserve is deducted from the GIRD value on a sum (not RSS) basis.</p> <p>4. GIRD and MRD requirements apply at the mounting interfaces of each nadir-pointed instrument with all instruments operating.</p> <p>5. The allocations to ABI and GLM are reflected in the corresponding UIIDs. These allocations are assumed to RSS.</p> <p>6. The allocations of attitude error, attitude stability, and attitude rate error are represented in the ABI and GLM UIIDs as requirements on exported instrument angular momentum and/or integrated angular momentum, which are independent of the spacecraft dynamics. The constraints on exported instrument disturbances in the UIIDs were calculated assuming a government strawman spacecraft model, based on the allocations shown below.</p> <p>7. SUVI/EXIS contribution to pointing error at the nadir instrument mounting interfaces will be determined by the s/c contractor and is included under "other."</p> <p>8. "Other" allocations are with no instruments operating except SUVI/EXIS. The value shown is the RSS remainder of MRD Goal minus the RSS of the ABI, and GLM. "Other" allocations will be derived by prime contractor such that spacecraft-to-instrument interface pointing and disturbance requirements under the "GIRD" and "S/C FPS" columns in the tables below are met.</p>
PRAD 40	6.2.1.2	<b>6.2.1.2 Linear Acceleration Limits</b>
PRAD 41	6.2.1.2.0 -1	The linear acceleration limits for Nadir-Pointing instruments <b>shall</b> be in accordance with the Linear Acceleration Limits Table given below.



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PRAD 6.2.1.2.0  
41 -1

**Linear Translational Acceleration Limits Table**

f <sub>1</sub> (Hz)	f <sub>2</sub> (Hz)	GIRD (milli-g)	Government Reserve		S/C FPS (milli-g)	ABI			Adv Instr (milli-g)	GLM (milli-g)	Other (milli-g)
			(milli-g)	(%)		Total (milli-g)	"hats" (milli-g)	w/o (milli-g)			
0.0	512.0	18.44	7.37	40%	11.07	8.80	6.44	6.00	6.00	0	3.00
0.9	10.1	1.50	0.60	40%	0.90	0.60		0.60	0.60	0	0.30
6.3	32.0	1.00	0.40	40%	0.60	0.40		0.40	0.40	0	0.20
20.2	101.6	4.29	1.71	40%	2.58	2.20	1.84	1.20	1.20	0	0.60
64.0	322.5	10.55	4.22	40%	6.33	5.50	4.73	2.80	2.80	0	1.40
203.2	512.0	15.16	6.06	40%	9.10	6.60	3.49	5.60	5.60	0	2.80
9.0	10.1	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
9.5	10.7	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
10.1	11.3	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
10.7	12.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
11.3	12.7	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
12.0	13.5	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
12.7	14.3	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
13.5	15.1	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
14.3	16.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
15.1	17.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
16.0	18.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
17.0	19.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
18.0	20.2	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
19.0	21.4	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
20.2	22.6	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
21.4	24.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
22.6	25.4	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
24.0	26.9	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
25.4	28.5	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
26.9	30.2	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
28.5	32.0	0.40	0.16	40%	0.24	0.16		0.16	0.16	0	0.08
30.2	33.9	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
32.0	35.9	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
33.9	38.1	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
35.9	40.3	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
38.1	42.7	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
40.3	45.3	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
42.7	47.9	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
45.3	50.8	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
47.9	53.8	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
50.8	57.0	3.18	1.27	40%	1.91	1.80	1.71	0.56	0.56	0	0.28
53.8	60.4	3.18	1.27	40%	1.91	1.80	1.71	0.56	0.56	0	0.28
57.0	64.0	3.18	1.27	40%	1.91	1.80	1.71	0.56	0.56	0	0.28
60.4	67.8	3.18	1.27	40%	1.91	1.80	1.71	0.56	0.56	0	0.28
64.0	71.8	3.18	1.27	40%	1.91	1.80	1.71	0.56	0.56	0	0.28
67.8	76.1	3.18	1.27	40%	1.91	1.80	1.71	0.56	0.56	0	0.28
71.8	80.6	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
76.1	85.4	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
80.6	90.5	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
85.4	95.9	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
90.5	101.6	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
95.9	107.6	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
101.6	114.0	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
107.6	120.8	2.40	0.96	40%	1.44	1.30	1.17	0.56	0.56	0	0.28
114.0	128.0	2.40	0.96	40%	1.44	1.30	1.17	0.56	0.56	0	0.28
120.8	135.6	2.40	0.96	40%	1.44	1.30	1.17	0.56	0.56	0	0.28
128.0	143.7	2.40	0.96	40%	1.44	1.30	1.17	0.56	0.56	0	0.28
135.6	152.2	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
143.7	161.3	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
152.2	170.9	1.40	0.56	40%	0.84	0.56		0.56	0.56	0	0.28
161.3	181.0	3.02	1.21	40%	1.81	1.70	1.61	0.56	0.56	0	0.28
170.9	191.8	3.02	1.21	40%	1.81	1.70	1.61	0.56	0.56	0	0.28
181.0	203.2	3.02	1.21	40%	1.81	1.70	1.61	0.56	0.56	0	0.28
191.8	215.3	3.02	1.21	40%	1.81	1.70	1.61	0.56	0.56	0	0.28
203.2	228.1	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
215.3	241.6	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
228.1	256.0	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
241.6	271.2	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
256.0	287.4	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
271.2	304.4	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
287.4	322.5	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
304.4	341.7	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
322.5	362.0	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
341.7	383.6	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
362.0	406.4	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
383.6	430.5	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
406.4	456.1	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
430.5	483.3	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28
456.1	512.0	2.56	1.03	40%	1.53	1.40	1.28	0.56	0.56	0	0.28

<b>ID</b>	<b>Object Number</b>	<b>417-R-RAD-0061, RM Version, Payload Resource Allocation Document</b>
PRAD 41	6.2.1.2.0 -1	Notes: <ol style="list-style-type: none"><li>1. The linear accelerations do not follow across-the-board percentage allocations, due to allowances given to the ABI for its cryocooler disturbances (denoted as “hats” in the table).</li><li>2. ABI disturbance allocations are shown under the “ABI total” column. This is further decomposed for clarity as “ABI hats” and “ABI w/o hats.” “ABI hats” shows the additional RSS allocations given to the ABI to accommodate its cryocooler disturbances.</li></ol>
PRAD 42	6.2.1.3	<b>6.2.1.3 Shock Response Spectra</b>

## ID Object Number 417-R-RAD-0061, RM Version, Payload Resource Allocation Document

PRAD 6.2.1.3.0 The shock response spectra requirements for nadir-pointing instruments **shall** be in accordance with the  
43 -1 Shock Response Spectra Table given below.

### Shock Response Spectra ( $\pm Q$ )

$f_1$ (Hz)	GIRD / MRD Threshold (milli-g)	Reserve (milli-g)	Reserve (%)	F/Pspec / MRD Goal (milli-g)	ABI total (milli-g)	ABI "hats" (milli-g)	ABI w/o "hats" (milli-g)	Advanced Instru- ment (milli-g)	GLM (milli-g)	Other (milli-g)
10	0.20	0.08	40%	0.12	0.08	0	0.08	0.08	0	0.04
30	0.20	0.08	40%	0.12	0.08	0	0.08	0.08	0	0.04
30	0.60	0.24	40%	0.36	0.24	0	0.24	0.24	0	0.12
52	0.60	0.24	40%	0.36	0.24	0	0.24	0.24	0	0.12
59	2.70	1.08	40%	1.62	1.60	1.58	0.24	0.24	0	0.12
66	2.70	1.08	40%	1.62	1.60	1.58	0.24	0.24	0	0.12
73	0.60	0.24	40%	0.36	0.24	0	0.24	0.24	0	0.12
90	0.60	0.24	40%	0.36	0.24	0	0.24	0.24	0	0.12
90	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
112	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
118	2.05	0.82	40%	1.23	1.16	1.10	0.36	0.36	0	0.18
132	2.05	0.82	40%	1.23	1.16	1.10	0.36	0.36	0	0.18
138	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
165	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
177	2.81	1.13	40%	1.69	1.64	1.60	0.36	0.36	0	0.18
198	2.81	1.13	40%	1.69	1.64	1.60	0.36	0.36	0	0.18
210	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
225	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
236	2.08	0.83	40%	1.25	1.18	1.12	0.36	0.36	0	0.18
264	2.08	0.83	40%	1.25	1.18	1.12	0.36	0.36	0	0.18
275	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
285	0.90	0.36	40%	0.54	0.36	0	0.36	0.36	0	0.18
295	1.64	0.66	40%	0.99	0.90	0.82	0.36	0.36	0	0.18
300	1.64	0.66	40%	0.99	0.90	0.82	0.36	0.36	0	0.18

#### Notes:

1. The shock response spectra do not follow across-the-board percentage allocations, due to allowances given to the ABI for its cryocooler disturbances (denoted as "hats" in the tables).
2. Values shown are divided by  $Q=50$  to compensate for amplification by the narrowband filter specified in the GIRD and UIIDs.
3. The Shock Response Spectra requirement is defined by the curve formed by connecting consecutive data points whose x coordinates are given in the "f (Hz)" column and whose y coordinates are shown in the other columns.
4. ABI disturbance allocations are shown under the "ABI total" column. This is further decomposed for clarity as "ABI hats" and "ABI w/o hats." "ABI hats" shows the additional RSS allocations given to the ABI to accommodate its cryocooler disturbances.

PRAD 6.2.2  
44

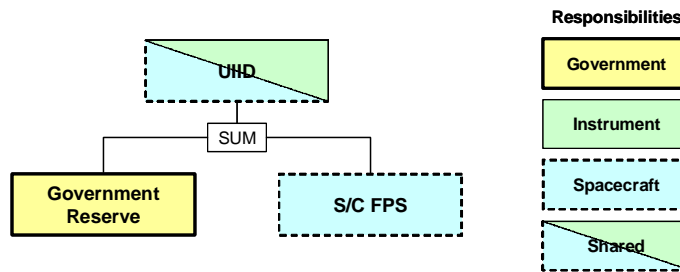
### 6.2.2 Sun Pointing Instruments

PRAD 6.2.2.0-  
45 1

The following figure shows the flow-down of spacecraft interface requirements, including responsibility for meeting the sun pointing instrument interface requirements.

**ID Object Number 417-R-RAD-0061, RM Version, Payload Resource Allocation Document**

PRAD 6.2.2.0-1  
45 1 **Interface Requirements Flow-Down**



PRAD 6.2.2.1  
46 **6.2.2.1 Spacecraft Pointing Requirements Allocation for SUVI**

PRAD 6.2.2.1.0  
47 -1 The spacecraft portion of the SUVI pointing allocation **shall** be in accordance with the Spacecraft Pointing Allocation for SUVI Table given below.

**Spacecraft Pointing Allocation for SUVI Table**

Pointing Requirement	Units	UIID	Government Reserve		S/C FPS
			Value	%	
Pointing Accuracy 3σ N/S & E/W	arcmin	1.5	0.5	33%	1
Pointing Stability 3σ radial over any 60 sec	arcsec	6	0.5	8%	5.5

PRAD 6.2.2.2  
48 **6.2.2.2 Spacecraft Pointing Requirements Allocation for EXIS**

PRAD 6.2.2.2.0  
49 -1 The spacecraft portion of the EXIS pointing allocation **shall** be in accordance with the Spacecraft Pointing Allocation for EXIS Table given below.

**Spacecraft Pointing Allocation for EXIS Table**

Pointing Requirement	Units	UIID	Government Reserve		S/C FPS
			Value	%	
Pointing Accuracy 3σ N/S & E/W	arcmin	5	2.5	50%	2.5
Pointing Stability 3σ N/S & E/W over any 60 sec	arcsec	20	5.0	25%	15
Pointing Knowledge 3σ N/S & E/W	arcsec	90	30.0	33%	60

1. Reserve is deducted from the UIID value on a sum (not RSS) basis.
2. UIID and S/C FPS requirements apply at the Sun Pointing Platform (SPP), with all instruments operating.
3. SPP pointing stability requirements are significantly tighter than those for Earth pointing instruments. The spacecraft is responsible for the SPP interface performance shown here.

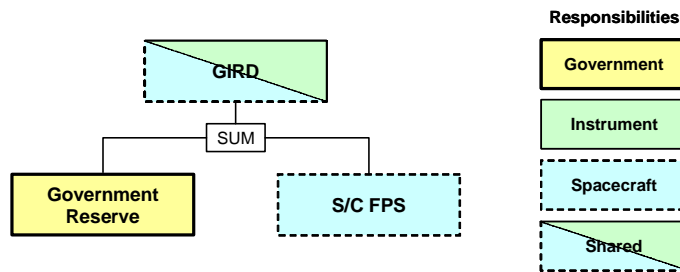
PRAD 6.2.3  
50 **6.2.3 Orbit Knowledge Requirement Allocation**

PRAD 6.2.3.0-1  
51 1 The following figure shows the conceptual spacecraft orbit knowledge requirements flow-down.

**ID Object Number 417-R-RAD-0061, RM Version, Payload Resource Allocation Document**

PRAD 6.2.3.0-51 1

**Orbit Knowledge Requirements Flow-Down**



PRAD 6.2.3.0-52 2

The spacecraft orbit knowledge requirement **shall** be in accordance with the Orbit Knowledge Table given below.

**Orbit Knowledge Table**

Requirement	Units	GIRD	Government Reserve		S/C FPS
			Value	%	
Position Accuracy 3σ: In-Track, Cross-Track	m	100	25	25%	75
Position Accuracy 3σ: Radial	m	100	0	0%	100
Velocity Accuracy 3σ: Per Axis	cm/sec	6	0	0%	6

PRAD 6.2.3.0-53 3

The spacecraft orbit position knowledge error stability **shall** not exceed the levels specified in the Orbit Position Knowledge Error Stability Table given below. No margin is held.

**ID**  
**Object**  
**Number**

**417-R-RAD-0061, RM Version, Payload Resource Allocation Document**

PRAD 6.2.3.0-  
53 3

**Orbit Position Knowledge Error Stability Table**

Requirement	Units	GIRD	Government Reserve		S/C FPS
			Value	%	
In-Track Error Stability over any 30 sec window	m	3	0	0%	3
In-Track Error Stability over any 300 sec window	m	20	0	0%	20
In-Track Error Stability over any 600 sec window	m	30	0	0%	30
In-Track Error Stability over any 900 sec window	m	35	0	0%	35
Cross-Track Error Stability over any 30 sec window	m	3	0	0%	3
Cross-Track Error Stability over any 300 sec window	m	20	0	0%	20
Cross-Track Error Stability over any 600 sec window	m	30	0	0%	30
Cross-Track Error Stability over any 900 sec window	m	35	0	0%	35
Radial Error Stability over any 30 sec window	m	7	0	0%	7
Radial Error Stability over any 300 sec window	m	40	0	0%	40
Radial Error Stability over any 600 sec window	m	60	0	0%	60
Radial Error Stability over any 900 sec window	m	70	0	0%	70

**ID      Object Number      417-R-RAD-0061, RM Version, Payload Resource Allocation Document**

PRAD 7  
54      **7 Instrument Thermal Backload Allocation**

PRAD 7.0-1      The spacecraft imposed backload on the instrument radiators **shall** not exceed that listed in the tables below.  
55

PRAD 7.1  
56      **7.1 Thermal Backload Allocation for SUVI**

PRAD 7.1.0-1      The spacecraft maximum thermal backloading on the SUVI instrument radiator **shall** be in accordance with the SUVI Radiator Backloading Table given below.  
57

**SUVI Radiator Backloading Table**

Instrument Radiator	Spacecraft Maximum Instrument Backload	Government Reserve		UIID Backload Allocation
	W/m <sup>2</sup>	W/m <sup>2</sup>	%	W/m <sup>2</sup>
SUVI-X / (anti-sun)	80	15	16%	95
SUVI +Z aft 35cm	130	25	16%	155

PRAD 7.2  
58      **7.2 Thermal Backload Allocation for EXIS**

PRAD 7.2.0-1      The spacecraft maximum thermal backloading on the EXIS instrument radiator **shall** be in accordance with the EXIS Radiator Backloading Requirement Table given below.  
59

**EXIS Radiator Backloading Table**

Instrument Radiator	Spacecraft Maximum Instrument Backload	Government Reserve		UIID Backload Allocation
	W/m <sup>2</sup>	W/m <sup>2</sup>	%	W/m <sup>2</sup>
EXIS-X / (anti-sun)	80	15	16%	95
EXIS -Z aft 35cm	130	25	16%	155

ID	Object Number	417-R-RAD-0061, RM Version, Payload Resource Allocation Document	
PRAD 60	8	<b>8 Acronyms</b>	
PRAD 61	8.0-1	ABI	Advanced Baseline Instrument
		E/W	East -West
		EXIS	EUVS XRS Irradiance Sensors
		FOV	Field-of-View
		GIRD	General Interface Requirements Document
		GLM	Geostationary Lightning Mapper
		GOES	Geostationary Operational Environmental Satellite
		INR	Image Navigation and Registration
		LOS	Line-of-Sight
		MRD	Mission Requirements Document
		N/S	North - South
		PORD	Performance and Operational Requirements Document
		PSD	Power Spectral Density
		RAD	Resource Allocation Document
		RSS	Root Sum Square
		SEISS	Space Environment In-Situ Suite
		SSP	Sub Satellite Point
		SUVI	Solar Ultraviolet Imager
		UIID	Unique Instrument Interface Document
		W	Watts



## 417-R-RAD-0061 DCR

**CCR #:** 00088 Rev:  
Contract # NNG0 - N/A  
CCB Status: **Approved**  
CCB Date: 3/24/2005  
Contract Mod#: N/A  
Doc Change Date: 4/13/2005

**Title: GOES-R Payload Resource Allocation Document Baseline**  
GOES S/C: R Effectivity: S/C  
CCR Summary: Baselines 417-R-RAD-0061  
Doc #: 417-R-RAD-0061 Rev -  
Doc Section #: ALL  
DOORS Version: N/A  
DOORS ID #: N/A

**ECR #:** 00018 Rev:  
Contract # NNG0 - N/A  
CCB Status: **Approved**  
CCB Date: 10/3/2005  
Contract Mod#: N/A  
Doc Change Date: 8/15/2005

**Title: Update to GOES-R Payload Resource Allocation Document (RAD) SEISS Mass Allocation**  
GOES S/C: R Effectivity: S/C  
Doc #: 417-R-RAD-0061 Rev A  
Doc Section #: RAD 4.0  
DOORS Version: N/A  
DOORS ID #: N/A

**CCR #:** 00123 Rev:  
Contract # NNG0 - 5HY06C  
CCB Status: **Approved**  
CCB Date: 10/11/2005  
Contract Mod#: N/A  
Doc Change Date: 10/11/2005

**Title: SEISS Mass Increase**  
GOES S/C: R Effectivity: SEISS Instrument  
Doc #: 417-R-SEISSUIID-0031, 417-R-RAD-0061 Rev B  
Doc Section #: SEISSUIID 3.3.1, RAD 4.0  
DOORS Version: SEISSUIID 2.0  
DOORS ID #: SEISSUIID44 (3.3.1.0-1)

**CCR #:** 00133 Rev:  
Contract # NNG0 -  
CCB Status: **Approved**  
CCB Date: 11/2/2005  
Contract Mod#: N/A  
Doc Change Date: 11/16/2005

**Title: Update to GOES-R Payload Resource Allocation Document (RAD) Sun-Pointing Instruments**  
GOES S/C: R Effectivity:  
Doc #: 417-R-RAD-0061 Rev C  
Doc Section #: 6.2.2  
DOORS Version: N/A  
DOORS ID #: N/A

**CCR #:** 00153 Rev:  
Contract # NNG0 - 4HZ07C  
CCB Status: **Approved**  
CCB Date: 12/22/2005  
Contract Mod#: ABI 028  
Doc Change Date: 12/27/2005

**Title: Update to ABI UIID and GOES-R RAD for ABI mass increase.**  
GOES S/C: R Effectivity: ABI Instrument  
Doc #: 417-R-ABIUIID-0010, 417-R-RAD-0061 Rev D  
Doc Section #: 3.3.1 (UIID), 4.0 (RAD)  
DOORS Version: ABIUIID 2.0, RAD N/A  
DOORS ID #: ABIUIID28 (3.3.1-1)

**CCR #:** 00154 Rev:  
Contract # NNG0 - 4HZ65C  
CCB Status: **Approved**  
CCB Date: 12/22/2005  
Contract Mod#: N/A  
Doc Change Date: 12/27/2005

**Title: Update to SIS UIID and GOES-R RAD for SIS mass increase.**  
GOES S/C: R Effectivity: SIS Instrument  
Doc #: 417-R-SISUIID-0034, 417-R-RAD-0061 Rev D  
Doc Section #: 3.3.1 (UIID), 4.0 (RAD)  
DOORS Version: SISUIID 1.0, RAD N/A  
DOORS ID #: N/A

**CCR #:** 00241 Rev:  
Contract # NNG0 - 4HZ07C,  
CCB Status: **Approved**  
CCB Date: 8/1/2006  
Contract Mod#: N/A  
Doc Change Date: 8/1/2006

**Title: PRAD Nadir-Pointing Instrument Update**  
GOES S/C: R Effectivity: S/C & ABI, HES, GLM Instruments  
CCR Summary:  
Doc #: 417-R-RAD-0061 Rev E  
Doc Section #: 6.2.1  
DOORS Version: N/A  
DOORS ID #: N/A

**CCR #:** 00247 Rev:  
Contract # NNG0 - 4HZ07C  
CCB Status: **Approved**  
CCB Date: 8/1/2006  
Contract Mod#: N/A

**Title: PRAD Power Changes**  
GOES S/C: R Effectivity: ABI & SIS Instrument  
Doc #: 417-R-RAD-0061 Rev E  
Doc Section #: 4.0, 5.0

Doc Change Date: 8/1/2006

DOORS Version: N/A  
DOORS ID #: N/A

**CCR #: 00299** Rev:  
Contract # NNG0 - 4HZ07C  
CCB Status: **Approved**  
CCB Date: 9/22/2006  
Contract Mod#: N/A  
Doc Change Date: 9/22/2006

**Title: PRAD ABI Mass Growth**  
GOES S/C: R Effectivity:  
Doc #: 417-R-RAD-0061 Rev F  
Doc Section #: 4.0  
DOORS Version: N/A  
DOORS ID #: N/A

**CCR #: 01067** Rev:  
Contract #  
CCB Status: **Approved**  
CCB Date: 8/06/2007  
Contract Mod#: N/A  
Doc Change Date: 08/06/2007

**Title: PRAD Re-baseline**  
GOES S/C: R Effectivity:  
Doc #: 417-R-RAD-0061  
Doc Section #: All  
DOORS Version: 2.0  
DOORS ID #: All

**CCR #: 01074** Rev:  
Contract #  
CCB Status: **Approved**  
CCB Date: 8/22/2007  
Contract Mod#: N/A  
Doc Change Date: 08/22/2007

**Title: PRAD SUVI Mass Update**  
GOES S/C: R Effectivity:  
Doc #: 417-R-RAD-0061  
Doc Section #: A4.0  
DOORS Version: 2.1  
DOORS ID #: PRAD (4.0-1)

**CCR #: 01135** Rev:  
Contract # N/A  
CCB Status: **Approved**  
CCB Date: 12/31/2007  
Contract Mod#: N/A  
Doc Change Date: 12/31/2007

**Title: PRAD SUVI Power Allocation Change**  
GOES S/C: R Effectivity:  
Doc #: 417-R-RAD-0061  
Doc Section #: 5.1, 5.2, 5.3, 5.4  
DOORS Version: 2.2  
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