ATK
ALLIANT TECHSYSTEMS
THIOKOL PROPULSION

CRITICAL ITEMS LIST (CIL)

No. 10-03-03-04/03

SYSTEM:	Space Shuttle RSRM 10	CRITICALITY CATEGORY:	1
SUBSYSTEM:	Ignition Subsystem 10-03	PART NAME:	Initiator Propellant (1)
ASSEMBLY:	Initiator Assembly 10-03-03	PART NO.:	(See Table A-3)
FMEA ITEM NO.:	10-03-03-04 Rev N	PHASE(S):	Boost (BT)
CIL REV NO.:	N	QUANTITY:	(See Table A-3)
DATE:	27 Jul 2001	EFFECTIVITY:	(See Table 101-6)
SUPERSEDES PAGE:	426-1ff.	HAZARD REF.:	BI-03
DATED:	31 Jul 2000		
CIL ANALYST:	F. Duersch		
APPROVED BY:		DATE:	

RELIABILITY ENGINEERING: K. G. Sanofsky 27 July 2001

ENGINEERING: G. A. Ricks 27 July 2001

1.0 FAILURE CONDITION: Failure during operation (D)

2.0 FAILURE MODE: 1.0 Ignition delay or failure to provide energy in the required time frame

3.0 FAILURE EFFECTS: Thrust imbalance between the two RSRMs results in loss of RSRM, SRB, crew, and vehicle

4.0 FAILURE CAUSES (FC):

FC NO.	DESCRIPTION	FAILURE CAUSE KEY
1.1	Improper propellant burn rate	
1.1.1	Improper formulation	A
1.1.2	Improper mixing of materials	B
1.1.3	Improper cure	C
1.1.4	Nonconforming raw materials	D
1.1.5	Nonconforming propellant density	E
1.1.6	Contamination	F
1.2	Initiator propellant weight is out of conformance	G
1.3	Improper grain configuration	H
1.4	Moisture/high humidity	
1.4.1	Initiator nozzle seals improperly installed	I
1.4.2	Moisture/high humidity during processing	J
1.5	Storage degradation	K
1.6	Propellant cracks, flaws, or voids	L
1.7	Improper casting of propellant	M

1.8	AP leaching	N

5.0 REDUNDANCY SCREENS:

SCREEN A: N/A
SCREEN B: N/A
SCREEN C: N/A

6.0 ITEM DESCRIPTION:

1. Initiator propellant is designated TP-H1178 and is composed of bimodal Ammonium Perchlorate (AP) oxidizer, spherical aluminum, ferric oxide, polybutadiene acrylic acid acrylonitrile HB polymer binder, and Epoxy Curing Agent (ECA).

2. The initiator casting process is designed to ensure the propellant grain configuration is free of foreign materials and objects. The initiator propellant grain configuration is a 30-point star web grain design. Star peaks and valleys are rounded to reduce the likelihood of stress discontinuities (Figures 1 and 2). After casting is completed and core removed, the initiator is inspected for cracks or voids.

3. Initiator propellant is up to peak thrust in 0.02 seconds and the main igniter is up to 90 percent of peak output by 0.045 seconds from time zero. The flame from the igniter exhausts onto the forward star of the forward segment and ignites this surface initially. Ignition of the rest of the propellant surface occurs very rapidly. RSRM internal pressure increases rapidly and achieves lift-off thrust in less than 0.3 seconds.

4. Initiator propellant is protected from atmospheric exposure by initiator seal disks bonded over the initiator nozzle inserts. Seals protect the loaded initiator from propellant degradation due to moisture or humidity. The seals are bonded into the initiator nozzle holes with asbestos float-filled epoxy sealant. The initiator is further protected from moisture and humidity by the inner gasket, packing with retainers, initiator nozzle port environmental seals, and Barrier-Booster seals. An igniter protective cover is required to seal the Safety and Arming (S&A) device attachment flange on the igniter adapter. The protective cover is temporary until the S&A device is installed at KSC. The cover is made of aluminum and has an O-ring seal.

5. Each lot of propellant raw materials is standardized per engineering to meet burn rate and mechanical property requirements. Materials are listed in Table 1.

TABLE 1. MATERIALS

Drawing No.	Name	Material	Specification	Quantity
	Propellant	TP-H1178	STW5-2833	A/R
		Terpolymer (PBAN)	STW4-2600	A/R
		Liquid Epoxy Resin	STW4-2601	A/R
		Ammonium Perchlorate with Conditioner	STW4-2602	A/R
		Ferric Oxide	STW4-2604	A/R
		Aluminum, Spherical	STW4-2832	A/R

The above materials make up TP-H1178 propellant that is used in the following parts:

1U77858	Igniter Initiator Chamber, Loaded		Various	1/motor
1U77372	Igniter Chamber, Loaded		Various	1/motor
1U76674	Forward Segment, Loaded		Various	1/motor

6.1 CHARACTERISTICS

1. Initiator propellant is designated as TP-H1178 and is composed of bimodal Ammonium Perchlorate (AP) oxidizer, spherical aluminum, ferric oxide, polybutadiene acrylic acid acrylonitrile HB polymer binder, and Epoxy Curing Agent (ECA).

2. The initiator propellant grain configuration is a 30-point star web grain design. The star peaks and valleys are rounded to reduce the likelihood of stress discontinuities (Figures 1 and 2).

7.0 FAILURE HISTORY/RELATED EXPERIENCE:

1. Current data on test failures, flight failures, unexplained failures, and other failures during RSRM ground processing activities can be found in the PRACA Database.

8.0 OPERATIONAL USE: N/A

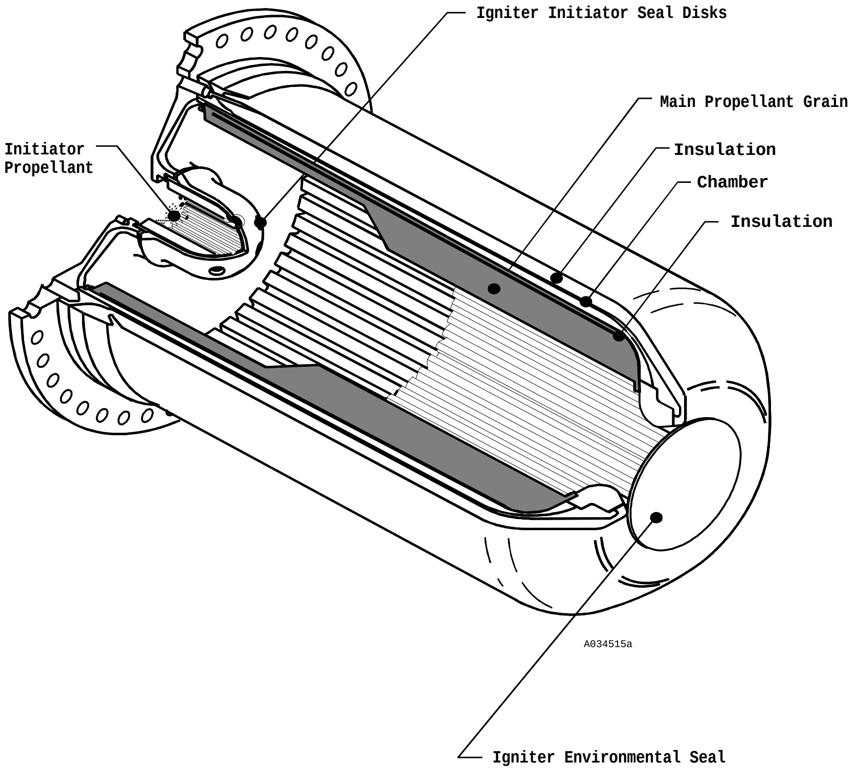

Figure 1. Igniter and Initiator Propellant Grain Configurations

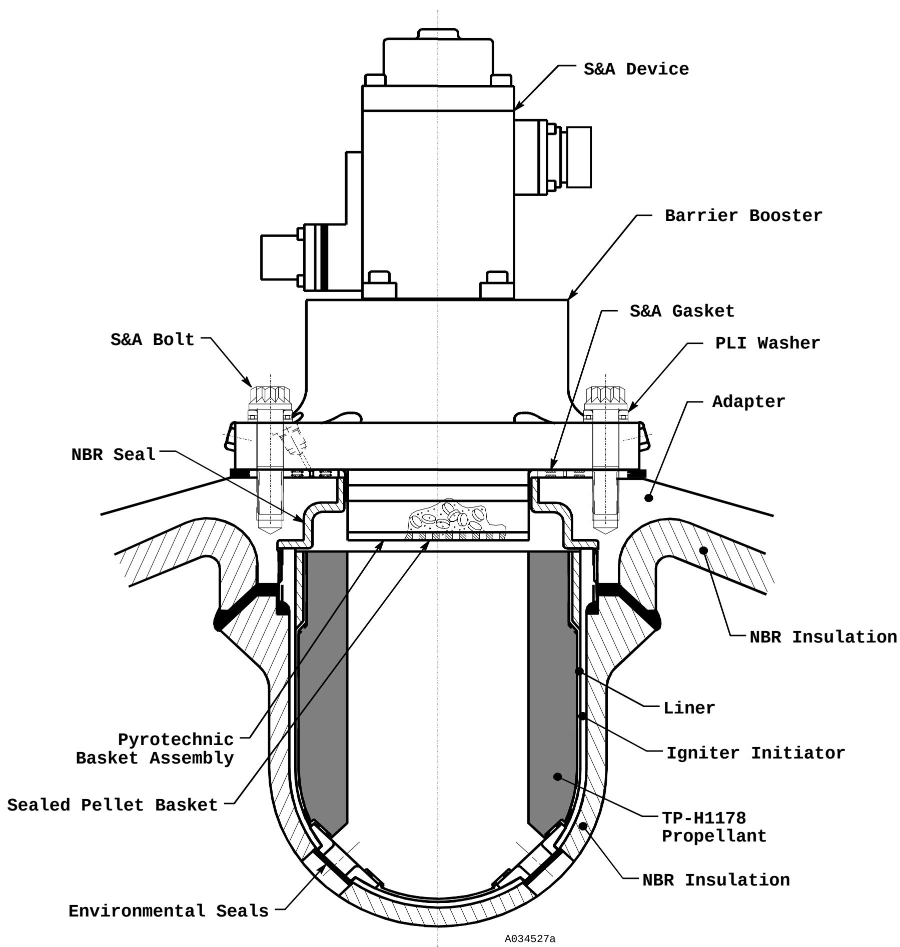

Figure 2. Loaded Igniter Initiator

9.0 RATIONALE FOR RETENTION:

9.1 DESIGN:

DCN FAILURE CAUSES

DCN		
A,B,C,E,F	1.	Mix proportions and mechanical property requirements of Igniter/Initiator Propellant (TP-H1178) are per engineering.
A,B,C,E,F	2.	Fine adjustments for percent of ground AP, (HB) polymer, and ECA proportions are determined by standardization per engineering to meet burn rate requirements and propellant mechanical properties. Average burn rate of 5-inch Center Perforated (CP) motors is used to adjust percent ground oxidizer content that adjusts the burn rate. Liquid Strand Burn Rate (LSBR) of standardization batches is used to determine the target burn rate of production propellant batches. Tests on loaf samples are processed to determine propellant mechanical properties. Propellant standardization is the process of determining the percentages of raw materials that will produce the desired propellant physical and ballistic properties of production batches per engineering.
A,B,F	3.	Material weighing is per engineering drawings and specifications.
A,B,C,E,F	4.	Propellant processing, mixing, and cure requirements are per engineering and shop planning.
A,B,C,E,F	5.	Contamination control requirements and procedures are defined per TWR-16564. During propellant processing, temperature, moisture, humidity, and contamination are controlled per engineering drawings and shop planning.
A,B,C,E	6.	Qualification of the igniter initiator verifying compliance with contractual operational requirements is per TWR-12310 and additional qualification of the initiator used on the RSRM was reported in TWR-18764-03.
A,B,C,D,E	7.	Design engineering reviews, analyzes, and publishes results of 5-inch CP and Lot Acceptance Tests (LAT) per engineering.
D	8.	Raw material conformance specifications, material property requirements, and means of verification for TP-H1178 propellant are established per engineering for the following materials: a. Terpolymer (HB) b. Epoxy resin c. Ammonium Perchlorate d. Aluminum, spherical e. Ferric Oxide, Type I
G	9.	Final weight of igniter propellant is per engineering drawings and shop planning.
H,M	10.	Igniter initiator propellant grain configuration is controlled by configuring and positioning the initiator core assembly per engineering drawings and shop planning.
H,M	11.	Propellant grain in each loaded initiator chamber is traceable to and identified with a specific propellant mix per engineering.
H,M	12.	Igniter initiators are vacuum cast in a controlled environment to ensure a void-free propellant grain per engineering drawings and shop planning.
H,M	13.	Igniter initiator propellant grain casting is controlled per engineering drawings and

shop planning.

I,J,N 14. The igniter environmental seal is cured acrylonitrile butadiene rubber (NBR) which conforms to material properties per engineering. The seal is bonded over the igniter nozzle with an asbestos float-filled liquid epoxy resin sealant that contains a polyamide curing agent and a thixotropic agent. The environmental seal protects loaded igniter and initiator propellant from degradation due to exposure to moisture and humidity per engineering drawings and specifications.

I,J,N 15. Delta qualification temperature and humidity testing of loaded igniter assemblies with environmental seals in place showed no propellant performance degradation per TWR-12310 and TWR-12323.

I,J,N 16. Igniter initiator environmental seals are thick discs of cured asbestos and silicon dioxide-filled NBR. The seals are bonded over initiator openings with an adhesive. The seals protect the loaded initiator and igniter from propellant degradation due to exposure to moisture and humidity. The initiator is further protected from moisture and humidity by the inner gasket, packing with retainers, igniter environmental seal, and Barrier-Booster seals. An igniter protective cover is required to seal the S&A attachment flange on the igniter adapter. The cover is made of aluminum and has an O-ring seal.

I,J,N 17. Moisture, high humidity, and temperature conditions are maintained within limits during AP storage and during propellant mixing operations per engineering drawings and shop planning.

I,J,N 18. Sealant raw material specifications are defined in engineering for the following materials:

a. Asbestos float
b. Liquid epoxy resin
c. Polyamide curing agent
d. Microfine silicon dioxide

K 19. Data obtained from igniter initiators that were aged up to 64 months prior to testing indicated no detectable performance change from aging per TWR-13003 and TWR-14726.

K 20. Propellant raw materials have storage life from date of manufacture when stored at warehouse ambient conditions in unopened containers or containers that were resealed after each use. The storage life expiration date of an individual lot of material may be extended provided the material satisfactorily passes retest requirements. Contamination control requirements and procedures are described in TWR-16564. During propellant processing, temperature, moisture, humidity, and contamination are controlled per engineering drawings and shop planning for the following materials:

a. Terpolymer (HB)
b. Epoxy resin
c. Ammonium Perchlorate (AP)
d. Aluminum, spherical
e. Ferric Oxide, Type I

K 21. Vibration and shock tests are performed on igniter initiators per CTP-0011 to simulate transportation and handling induced stresses in initiator propellant. A temperature and humidity test is performed per MIL-STD-331. Performance capability of the initiator shall not be adversely affected by a maximum storage period of five years within a specified temperature range per TWA-1009. A TP-

H1178 propellant aging study was performed on igniters and 5-inch CP motors per TWR-13003. The final conclusion is that if an igniter burn rate-aging affect exists it is significantly smaller than the normal propellant mix burn rate variation. Data obtained from the aged 5-inch CP motors for 75 months showed a possible burn rate decrease with age. The burn rate decrease is small in comparison with the normal igniter burn rate variation of a propellant mix.

K 22. Mechanical properties data from an aging test of TP-H1178 propellant indicate allowable stresses, strains, and elastic modulus are not affected by aging per TWR-19292.

K 23. The igniter initiator is included in RSRM Forward Segment life verification.

L 24. Structural analysis of TP-H1178 propellant grain was performed to verify acceptable factors of safety and that the grain meets design requirements for thermal, pressure, transportation and handling, and dynamic loading per TWR-17195.

L 25. Igniter initiator acceptance criteria for cracks, voids, inclusions, bond separation, and foreign objects are per engineering.

L 26. Igniter loaded chambers are radiographically inspected perpendicular to the centerline in 12 views, 30 degrees apart to determine propellant subsurface characteristics per TWR-11345.

L 27. The Igniter and Initiator Assembly is shipped installed in the forward segment. Rail car transportation shock and vibration levels for the forward segment are monitored as required per engineering. Monitoring records are evaluated by Thiokol to verify shock and vibration levels defined per MSFC specifications were not exceeded.

J,N 28. A Shore A hardness test is performed on a cure-cup sample at the time of hardware application on each batch of sealant to assure proper cure per shop planning.

C,E,F,L 29. As a result of the RSRM Performance Enhancement (PE) Program, load factors for ignition system PLI (Propellant, Liner, and Insulation) components were updated. Structural responses to both the original and PE loads cases were analytically compared. For all conditions, there were insignificant changes in induced stresses and therefore none of the ignition system PLI structural safety factors were changed as a result of the RSRM PE program per TWR-73983.

9.2 TEST AND INSPECTION:

DCN	FAILURE CAUSES and TESTS (T)			CIL CODE
		1.	For New Propellant, SRM, Igniter, verify:	
	A,B,F	a.	Acceptability of AP during oxidizer preparation	AOW008
	A,B,F	b.	Cleanliness and acceptability of facility during oxidizer preparation prior to grinding	AOW009
	A,B,F	c.	Cleanliness and acceptability of tote bins during oxidizer preparation prior to grinding	AOW016
	A,B,F	d.	Actual temperature of heated water during propellant processing	AOW024
	A,B,F	e.	All containers are free from moisture, contamination, and foreign objects during premix preparation	AOW028
	A,B,F	f.	All equipment is free from moisture, contamination, and foreign objects during premix preparation	AOW030
	D	g.	Spherical aluminum plus Ferric Oxide production batches, uncured propellant	AOW052
	A,B,F	h.	Spherical aluminum properly conditioned during premix preparation	AOW065
	A,B,F	i.	AP conditioning during oxidizer preparation	AOW067
	A,B,F	j.	AP conditioning requirement met during propellant processing	AOW068
	A,B,F	k.	AP spillage weight is within allowable limits during propellant mixing operations	AOW077
	A,B,F	l.	AP stock and lot numbers comply with batch card during propellant processing	AOW080
	A,B,F	m.	Cleanliness of mixing facility prior to mixing	AOW092
	A,B,F	n.	ECA properly conditioned during premix preparation	AOW128
	A,B,F	o.	End of mix temperature requirement met during propellant processing	AOW130
	A,B,F	p.	Ground oxidizer particle size distribution production batches	AOW134
	A,B,F	q.	Ground oxidizer particle size distribution sampling requirements met during oxidizer preparation	AOW140
	A,B,F	r.	HB polymer properly conditioned during premix preparation	AOW145
	A,B,D,E,F (T)	s.	LSBR production batches, uncured propellant	AOW154
	A,B,F	t.	Mill load setting acceptable during oxidizer preparation	AOW167
	A,B,E,F	u.	No lumps in propellant during propellant processing, after mixing	AOW169
	D	v.	Oxidizer content production batches, uncured propellant	AOW172
	D	w.	Percent HB polymer production batches, uncured propellant	AOW182
	A,B,F	x.	Premix constituent weights comply with batch card during propellant processing	AOW190
	A,B,F	y.	Premix constituents stock and lot numbers comply with batch card	AOW193
	A,B,C,E,F	z.	Propellant samples taken after propellant mixing from different locations in the mix bowl	AOW207
	A,B,F	aa.	Sieve analysis test during oxidizer preparation	AOW210
	A,B,F	ab.	Stock and lot number of AP during oxidizer preparation	AOW216
	D (T)	ac.	Strain at maximum stress production batches	AOW218
	D (T)	ad.	Maximum stress production batches	AOW228
	A,B,F	ae.	Total oxidizer mixing time requirement during propellant processing	AOW238
	A,B,C,D,E,F	af.	Total solids production batches, uncured propellant	AOW243
	A,B,F	ag.	Weight of spherical aluminum in bowl meets requirements during premix preparation	AOW258
	A,B,F	ah.	Weight of AP spillage does not exceed maximum allowable limits during oxidizer preparation	AOW262
	A,B,F	ai.	Weight of ECA meets weight requirements during premix preparation	AOW263
	A,B,F	aj.	Weight of ground AP during oxidizer preparation	AOW265
	A,B,F	ak.	Weight of ground AP complies with batch card during propellant processing	AOW267
	A,B,F	al.	Weight of HB polymer in bowl during premix preparation	AOW268

A,B,F	am.	Weight of iron oxide in mix bowl meets weight requirements during propellant premix preparation	AOW274
A,B,F	an.	Weight of unground AP during oxidizer preparation	AOW275
A,B,F	ao.	Weight of unground AP complies with batch card during propellant processing	AOW277
A,B,F	ap.	Total AP weight (ground plus unground) meets allowable limits during oxidizer preparation	AOW279

2. For New Chamber Assembly, Igniter Initiator-Loaded, verify:

K,L	a.	Propellant grain surfaces are free from unacceptable anomalies per the igniter process finalization specification	AAM003
I,J,K,N	b.	Component temperatures and exposure to ambient environments during in-plant transportation or storage are per the in-plant exposure limit and transportation specification	BAA012
A,B,C,E,F	c.	Tooling and initiator chamber surfaces are clean and dry prior to liner application	AAM014
A,B,C,E,F	d.	Each loaded initiator assembly for general condition and properly packaged prior to shipping to stores	AAM025
K	e.	Initiator nozzle seals correctly installed into initiator chamber nozzle ports	AAM033
A,B,C,E,F	f.	Tooling is clean and dry prior to tooling dry-fit	AOW050
H,M	g.	Plunge seating of core into cast initiator	AAM057
L	h.	Propellant cure is complete	AAM064
H,M	i.	Each initiator in the lot is cast in one production run from the same propellant mix and identified with propellant mix number per engineering drawings	AAM065
H,M	j.	Vacuum casting of propellant	AAM086
G	k.	Correct weighing system is used, is free of damage, was calibrated, and is within calibration period per engineering	AAM088
A,B,C,E,F	l.	All tooling and liner are clean and dry immediately prior to casting per shop planning	AOW089
G,H,M	m.	Weight of initiator propellant added per the mass properties measurement specification	AAM094

3. For New 5-inch CP, Igniter Propellant, verify:

A,B,C, D,E,F, (T)	a.	5-inch CP motor test data for propellant standardization and burn rate per engineering	AOW000

4. For New Igniter Assembly verify:

I,J,K,N	a.	Component temperatures and exposure to ambient environments during in-plant transportation or storage are controlled per the temperature exposure limit specification	BAA015
A,B,C,D,E,F, H,K,L,M (T)	b.	Initiator LAT for proper propellant burn time and pressure per the igniter specification	AKU021
H,L,M	c.	Workmanship, general condition, and freedom from contamination of initiator prior to installation	AAM097
I,J,N	d.	Inner gasket and inner bolt redundant seals are leak tested with an acceptable leak rate per the leak check specification	AEF108,AEF120
I,J,N	e.	Packing with retainer seals are bubble tested after bolt loading per the leak test specification	AEF120A

5. For New HB Polymer, verify:

D	(T)	a.	Acid number	ALC000,ALC001,ALC004
D	(T)	b.	Acrylonitrile content	ALC005,ALC006,ALC009
D	(T)	c.	Agerite stalite content	ALC010,ALC011,ALC014
D	(T)	d.	Cetyldimethyl benzyl ammonium chloride content	ALC015,ALC016,ALC019
D	(T)	e.	Chloride	ALC020,ALC021,ALC024
D	(T)	f.	Unbound/total acid ratio	ALC025,ALC026,ALC029
D	(T)	g.	Infrared spectrum	ALC030,ALC031,ALC034
D	(T)	h.	Iron content	ALC035,ALC036,ALC039
D	(T)	i.	Moisture content	ALC040,ALC041,ALC045
D		j.	No shipping or handling damage	ALC046
D	(T)	k.	Viscosity	ALC060,ALC061,ALC064
D		l.	Workmanship shall be such that the HB polymer is a viscous liquid, light to dark amber/brown in color, which may contain small visible particulates	ALC065B

6. For Retest HB Polymer verify:

K	(T)	a.	Viscosity	ALC050
K	(T)	b.	Acid number	ALC050A
K	(T)	c.	Moisture content	ALC050B
K	(T)	d.	Iron content	ALC050C
K	(T)	e.	Infrared spectrum	ALC050D

7. For New Liquid Epoxy Resin verify:

D,I,J,N	(T)	a.	Hydrolyzable chlorine percent	ALD006,ALD009,ALD015
D,I,J,N	(T)	b.	Infrared spectrum	ALD030
D,I,J,N	(T)	c.	Moisture percent	ALD035,ALD038,ALD042
D		d.	No shipping or handling damage	ALD052
D,I,J,N	(T)	e.	Specific gravity	ALD061,ALD063,ALD068
D,I,J,N	(T)	f.	Viscosity	ALD082,ALD085,ALD091
D,I,J,N	(T)	g.	Weight per epoxy	ALD098,ALD101,ALD107

8. For Retest Liquid Epoxy Resin verify:

K	(T)	a.	Moisture	ALD989
K	(T)	b.	Hydrolyzable chlorine percent	ALD011
K	(T)	c.	Viscosity	ALD083
K	(T)	d.	Weight per epoxy	ALD103

9. For New Ammonium Perchlorate, verify:

D	(T)	a.	Acid insolubles	ALE001,ALE002,ALE006
D	(T)	b.	Bromate	ALE007,ALE008,ALE011
D	(T)	c.	Bulk density	ALE012,ALE013,ALE016
D	(T)	d.	Chlorate	ALE017,ALE018,ALE020
D	(T)	e.	Chloride	ALE022,ALE023,ALE026
D	(T)	f.	External moisture content	ALE028,ALE029,ALE032
D	(T)	g.	Internal moisture content	ALE033,ALE034,ALE037
D	(T)	h.	Iron	ALE038,ALE039,ALE042
D		i.	No shipping or handling damage	ALE044
D	(T)	j.	Particle size distribution	ALE045,ALE046,ALE050
D	(T)	k.	Assay, as ammonium perchlorate	ALE052,ALE055,ALE056
D	(T)	l.	pH	ALE058,ALE059,ALE062
D	(T)	m.	Phosphate	ALE063,ALE064,ALE067
D	(T)	n.	Photomicrographic analysis	ALE068,ALE069,ALE072
D	(T)	o.	Sulfated ash	ALE091,ALE092,ALE095
D	(T)	p.	Total moisture content	ALE097,ALE100,ALE101

D			q.	Workmanship is uniform in appearance and free from unacceptable contamination	ALE105
		10.	For Retest Ammonium Perchlorate, verify:		
K	(T)		a.	Total moisture	ALE078
K	(T)		b.	Internal moisture content	ALE078A
K	(T)		c.	External moisture content	ALE078B
K	(T)		d.	Particle size	ALE078C
		11.	For New Aluminum, Spherical, verify:		
D	(T)		a.	Active spherical aluminum	ALU000,ALU001,ALU004
D	(T)		b.	Iron content	ALU010,ALU011,ALU014
D			c.	No shipping or handling damage	ALF011
D	(T)		d.	Magnesium content	ALU015,ALU016,ALU019
D	(T)		e.	Particle size distribution	ALU020,ALU021,ALU024
D	(T)		f.	Volatile matter	ALU036,ALU037,ALU040
		12.	For Retest Aluminum, Spherical, verify:		
K	(T)		a.	Active spherical aluminum for life extension	MAA007
K	(T)		b.	Volatile matter for life extension	MAA008
		13.	For New Ferric Oxide, verify:		
D	(T)		a.	Calcination loss	ALG000,ALG001
K,D	(T)		b.	Iron content	ALG008,ALG010,ALG012
D			c.	No shipping or handling damage	ALG019
K,D	(T)		d.	Specific surface area	ALG009A,ALG031,ALG032
D			e.	Workmanship is uniform in appearance and free from visible contamination	ALG040
K,D	(T)		f.	Volatile loss	ALG009B,ALG049,ALG050
		14.	For New Floats, Asbestos verify:		
I,J,N	(T)		a.	Calcination loss	ALI002
I,J,N	(T)		b.	Fiber size distribution	ALI011
I,J,N	(T)		c.	pH (aqueous extract)	ALI023
I,J,N	(T)		d.	Volatile matter	ALI051
I,J,N	(T)		e.	Wet volume	ALI053
		15.	For Retest Floats, Asbestos verify:		
I,J,N			a.	Volatile matter for storage life extension	ALI051A
		16.	For New Curing Agent, Polyamide Liquid Resin, verify:		
I,J,N	(T)		a.	Amine value	ALQ001,AMQ006
I,J,N	(T)		b.	Ash content	AMQ015
I,J,N	(T)		c.	Color	ALQ026,AMQ028
I,J,N	(T)		d.	Specific gravity	AMQ033
I,J,N	(T)		e.	Viscosity	ALQ049,AMQ050
		17.	For New Silicon Dioxide, verify:		
I,J,N	(T)		a.	Bulk density	ALP002,ALP008
I,J,N	(T)		b.	Moisture	ALP058,ALP064

I,J,N (T) c. pH ALP097,ALP101
I,J,N (T) d. Loss on ignition ALP040

18. For New NBR, verify:

I,J,N (T) a. Elongation (calendered only) ALH010
I,J,N (T) b. Elongation ALH062,ALH065
I,J,N (T) c. Shore A hardness (calendered only) ALH102
I,J,N (T) d. Shore A hardness ALH098,ALH109
I,J,N (T) e. Specific gravity (calendered only) ALH118
I,J,N (T) f. Specific gravity ALH121,ALH126
I,J,N (T) g. Tensile strength (calendered only) ALH147
I,J,N (T) h. Tensile strength ALH149,ALH154
I,J,N i. Material workmanship including uniform appearance and free from contamination ALH168
I,J,N (T) j. Mooney viscosity (extrusions only) ALH170
I,J,N (T) k. Mooney viscosity ALH041,ALH046
I,J,N (T) l. Scorch characteristics (extrusions only) ALH171
I,J,N (T) m. Scorch characteristics ALH081,ALH086

19. For Retest NBR, verify:

I,J,N (T) a. Mooney viscosity ALH049
I,J,N (T) b. Scorch characteristics ALH087

20. For New Segment, Rocket Motor, Forward, verify:

I,J,K,N a. Component environments during in-plant transportation or storage BAA021
J,K,N b. S&A shipping cover is installed prior to igniter installation LHA319

21. KSC verifies:

K a. Life requirements for the expected launch schedule are met per OMRSD, File II, Vol III, C00CA0.030 OMD019
595 I,J,N b. Integrity of the S&A device and S&A gasket installation by high- and low-pressure leak test per OMRSD File V, Vol I, B47SA0.110 OMD072
K c. Igniter seal disk is free from punctures, debonds, or cracks, and that the disk is still sealed and intact and has no visible penetrations, debonds, or cracks per OMRSD, File V, Vol I, B47SG0.020 OMD075
I,J,N d. Prior to final assembly of motor that the S&A device port protection cover is intact and undamaged per OMRSD, File V, Vol I B47SG0.100 OMD083
A,B,C,E,F,H, I,J,K,L,M,N e. Initiator is free from the following per OMRSD, File V, Vol I B47SG0.111: OMD084

1. Surface condition where white crystals are present
595 2. Broken fins shall not exceed 1.7 inches
3. Moisture
4. AP leaching