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HAZARDS TESTING OF AMMONIUM PERCHLORATE

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US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
LARGE CALIBER
WEAPON SYSTEMS LABORATORY
DOVER, NEW JERSEY

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A series of hazard classification tests were conducted on ammonium perchlorate, nominal 200-micron size, packaged in 113.6 liter (30 gallon) DOT 37A-350, 20-gage steel drums with bolted ring closures, each containing approximately 113.4 kg (250 lb) of material. All tests were conducted in accordance with INTEREG, Transport of Dangerous Goods, 1981 Edition.

A first series of type 6a, single package tests, were conducted on single drums of ammonium perchlorate, each confined in all directions by 1 m (3.28 ft) (cont)

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20. ABSTRACT. (cont)

of sand bags and ignited by an S94 squib and 56.7 g (2 oz) of FFF black powder. In all tests the material thermally decomposed. There was no explosion, no overpressure detected, and no rupture, splitting, or fragmenting of the drum.

In a second series of type 6a, single package tests on single drums of ammonium perchlorate confined in the same manner as in the first type 6a series, the initiation source was a number 8 blasting cap. In this series the ammonium perchlorate also thermally decomposed and there was no explosion, no overpressure detected, and no rupture, splitting, or fragmenting of the drums.

For control and information purposes, a single drum of ammonium perchlorate was tested unconfined using an S94 squib and 56.7 g (2 oz) of FFF black powder as the ignition source. The ignition of the black powder caused the drum lid to pop off and ejected approximately one-third of the ammonium perchlorate from the drum. The ammonium perchlorate did not react or thermally decompose and there was no damage to the drum.

The series of 6b stack tests was not conducted due to the lack of any explosive effect in either of the type 6a, single package test series. This is in accordance with paragraph 4.5.5 of the INTEREG standard.

A type 6c bonfire test was conducted consisting of five drums of ammonium perchlorate steel-banded together and placed atop a steel crib approximately 1 m (3.28 ft) above the ground and surrounded by 500 mm of lumber drenched with approximately 53 liters (14 gallons) of diesel fuel and gasoline mixture (9:1 ratio). The entire mass was ignited by two sets of electric matches and 56.7 g (2 oz) of black powder set 180 degrees apart at the base of the stack. The ammonium perchlorate was consumed by the fire with no explosions, no overpressure detected, and no rupture, splitting, or fragmenting of the drums.

Based upon interpretation of test results as outlined, ammonium perchlorate, nominal 200-micron particle size, in 113.4 kg (250 lb) quantities in steel shipping drums does not meet the requirements for a Class 1 material.

SUMMARY

A series of hazard classification tests were conducted on ammonium perchlorate, nominal 200-micron size, packaged in 113.6 liter (30 gal) DOT 37A-350, 20-gage steel drums with bolted ring closures. Each drum contained approximately 113.4 kg (250 lb) of material, and tests were conducted in accordance with INTEREG, Transport of Dangerous Goods, 1981 Edition [1].

Tests conducted consisted of:

a. Six single package tests (type 6a) as outlined in Chapter 4, paragraphs 4.5.9 through 4.5.13, in Reference 1, three using a S94 squib and 56.7 g (2 oz) of FFF black powder as the ignition source, and three single package tests as outlined in Chapter 4, paragraphs 4.5.9 through 4.5.13, using a number 8 blasting cap as the initiating source.

b. A fire stack test as outlined in Chapter 4, paragraphs 4.5.18 through 4.5.21.

c. A single drum of ammonium perchlorate without any confinement ignited by a S94 squib and 56.7 g (2 oz) of FFF black powder.

Test results are summarized in the table which follows. There was no explosion of any of the contents, no fragmentation of the shipping drums, radiant flux was less than 0.3 Cal/(cm^2·s) at a radial distance of 15.24 m (50 ft), and there was no explosive hazard for any of the single package test series. There was no explosion, no rupture, splitting, or fragmenting of the shipping drums, and no explosive hazard from the fire stack test. When the single drum without confinement was ignited by a S94 squib and 56.7 g (2 oz) of black powder, the lid of the shipping drum relieved and there was no ignition or reaction of the ammonium perchlorate.

Based upon interpretation of test results as outlined in Reference 1, figure 4.3, the test series 6 results indicate that ammonium perchlorate, nominal 200-micron particle size, in 113.4-kg (250-lb) quantities in steel shipping drums does not meet the requirements for a Class 1 material.

Type test	Ignition/ initiation method	Confinement	Results
Single package paragraphs 4.5.9 - 4.5.13	S94 and 56.7 g (2 oz) black powder	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
Single package paragraphs 4.5.9 - 4.5.13	S94 and 56.7 g (2 oz) black powder	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
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Single package paragraphs 4.5.9 - 4.5.13	Number 8 blasting cap	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
Single package paragraphs 4.5.9 - 4.5.13	Number 8 blasting cap	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
Single package paragraphs 4.5.9 - 4.5.13	Number 8 blasting cap	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
Fire stack test paragraphs 4.5.18 - 4.5.21	2 electric matches with black powder	Steel banded	No explosion, drum body intact, no explosive hazard
Single package	S94 and 56.7 g (2 oz) black powder	None	Lid relieved, no reaction of material

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INTRODUCTION

BACKGROUND

Ammonium perchlorate is an oxidizer ingredient, UN Class 5.1, used in the manufacture of composite solid propellants. The hazard classification of ammonium perchlorate UN No. 1442 (ammonium perchlorate oxidizer) has recently been questioned by the UN Committee of Experts on the Transport of Dangerous Goods, and to resolve this conflict, this series of tests was conducted in accordance with INTEREG, Transport of Dangerous Goods, 1981 Edition. These tests were conducted for the Large Caliber Weapons Systems Laboratory, Energetic Systems Processing Division, ARRADCOM, Dover, New Jersey.

OBJECTIVE

The objective of this study was to determine the behavior of ammonium perchlorate, nominal 200-micron size, packaged as indicated under Experimental Methods below, when subjected to Test Series 6 of the INTEREG, Transport of Dangerous Goods, 1981 Edition, Chapter 4, paragraphs 4.5.9 through 4.5.21.

EXPERIMENTAL METHODS

TEST ARTICLE

Ammonium perchlorate, nominal 200-micron size, manufactured by Kerr-McGee Chemical Corporation, lot number 7229-0013, was provided for this test series. The moisture content, purity and particle size analysis was provided by Thiokol Corporation, Wasatch Division, and is included in Appendix A. The ammonium perchlorate was packaged in 113.6 l (30 gal) DOT 37A-350 20-gage steel drums with bolted ring closures. The dimensions of the drums are 0.74 m high by 0.49 m in diameter with 0.8 mm thick walls. [Note: This is a heavier gage (20 gage vs 24 gage) drum than required for U.S. shipment of this material.] The material was packaged inside the drum in two conductive polyethylene bags with approximately 4.5 kg (10 lb) of dessicant placed atop the ammonium perchlorate inside the inner bag. Gross weight of the drums and contents averaged 119.5 kg (264 lb) and moisture content was approximately 0.007 percent.

MATERIAL SAMPLING

The test plan called for sample analysis to verify particle size distribution and moisture content of each drum. Particle size distribution was determined in accordance with MIL-STD-286B, section 506.1, and ASTM 300. A core sample was removed from the center of each drum by a standard core sampler. A 50-g sample was weighed and placed on a U.S. standard number 50 sieve. Number 80, 100, 120, 140, 200, 325 sieves and a catch pan were placed beneath the number 50 sieve. All sieves were inserted into a Tyler Model RX-21 portable sieve shaker for five minutes. The amount of material that remained on each sieve was weighed and reported. Two 50-g samples were taken from each drum.

After particle size analysis, the individual samples were recombined and weighed then placed into a vacuum oven at 75°C (167°F) temperature for two hours at 29 inches vacuum. Each sample was reweighed and the amount of weight loss was reported as the moisture content.

SINGLE PACKAGE TEST

A drum containing ammonium perchlorate was placed on a steel witness plate 0.81 m by 0.81 m by 12.7 mm thick (2.67 ft by 2.67 ft by 0.5 in) at ground level. A Chromel/Alumel thermocouple was positioned inside the drum 25.4 mm (1 in) above the ignition/initiation source. An additional Chromel/Alumel thermocouple was fixed to the outside of the drum near the center. For the first series of 6a single package tests, a S94 squib with 56.7 g (2 oz) of FFF black powder was positioned in the center of the drum as the ignition source. The drum was confined by 1 m (3.28 ft) of sand bags in all directions. The ignition source was ignited and the results were observed and recorded. The test was conducted three times. A typical test setup is shown in figure 1. The single package series was repeated using a number 8 blasting cap as an initiation source in place of the S94 squib and black powder igniter. This test was also conducted three times.

An additional test, not specified by the INTEREG procedures, was conducted where a S94 squib with 56.7 g (2 oz) of FFF black powder was placed in the center of an unconfined single drum and the squib and black powder ignited.

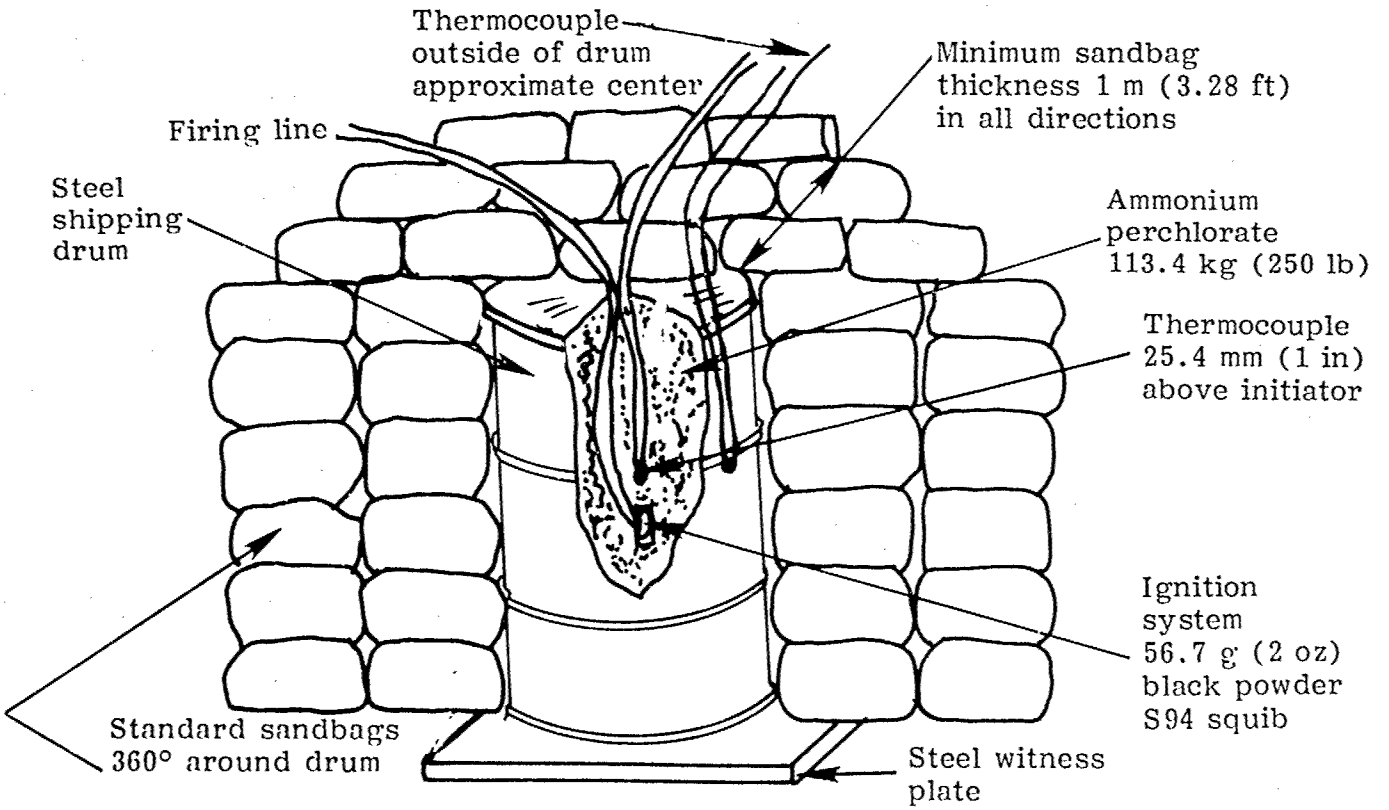


Figure 1. Single package test configuration (S94 squib with black powder shown)

STACK TEST

In accordance with the INTEREG, Transport of Dangerous Goods, 1981 Edition, paragraph 4.5.5, these tests were not conducted due to the lack of any explosive reaction during the series 6a, single package tests.

EXTERNAL FIRE STACK TEST

Five drums each containing approximately 113.4 kg (250 lb) of ammonium perchlorate were placed on a steel crib 1 m (3.28 ft) above the ground surface. The drums were steel banded around the girth of the drums in two places to maintain contact of the drums during the test. Air dried 50.8 mm by 101.6 mm by 1.5 m (2 in by 4 in by 59 in) lumber was placed beneath the crib in a lattice with a lateral separation of 101.6 mm (4 in). The entire crib was surrounded by 50.8 mm by 101.6 mm by 2.44 m (2 in by 4 in by 8 ft) lumber with a minimum thickness of 508 mm (20 in). The entire mass was drenched with approximately 53 l (14 gal) of a diesel fuel and gasoline mixture (9 to 1 ratio). The crib was ignited remotely by two electric matches each with 56.7 g (2 oz) of FFF black powder set 180° apart at the base. This test was conducted only once. The test setup is shown in figure 2.

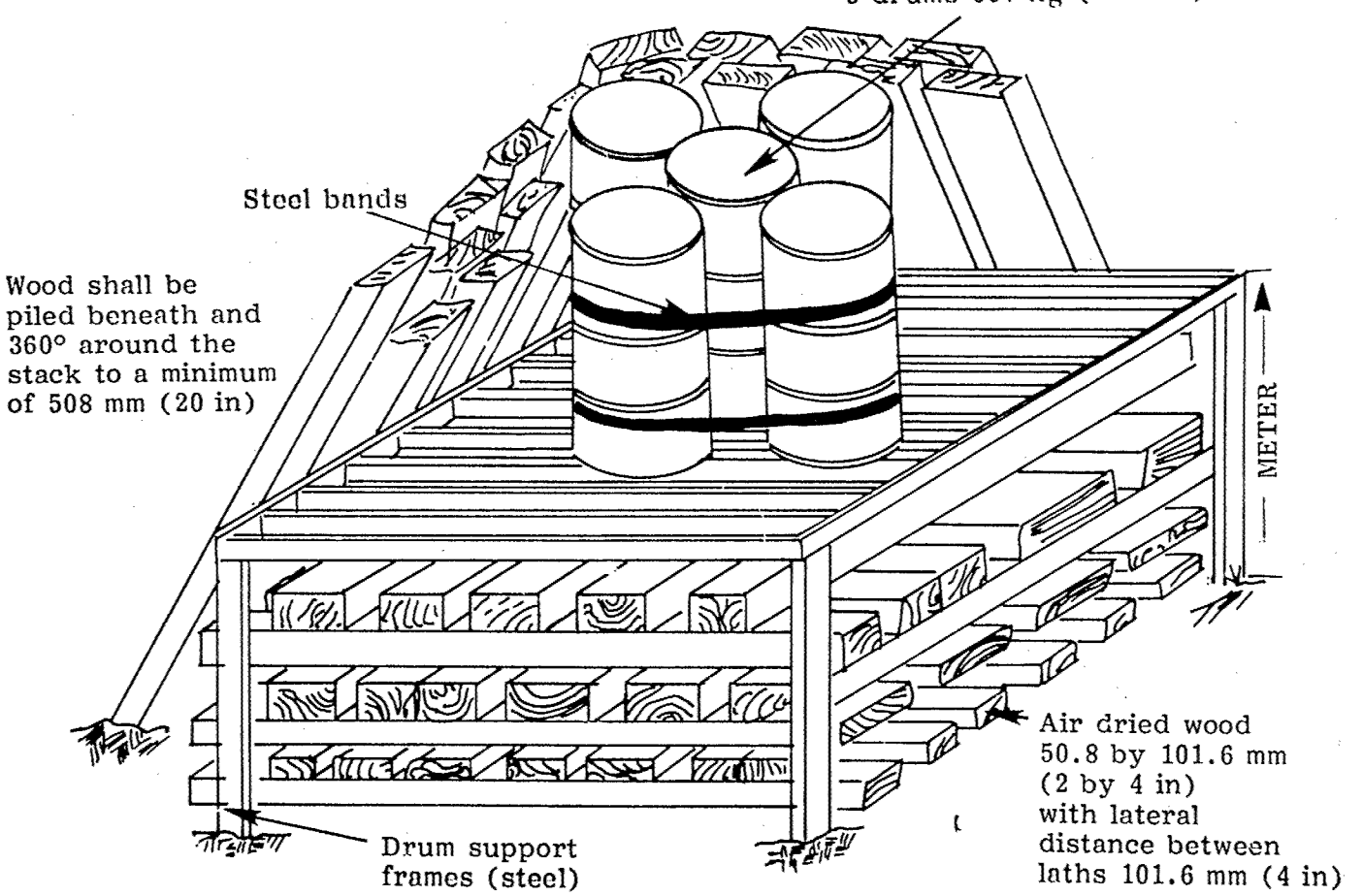
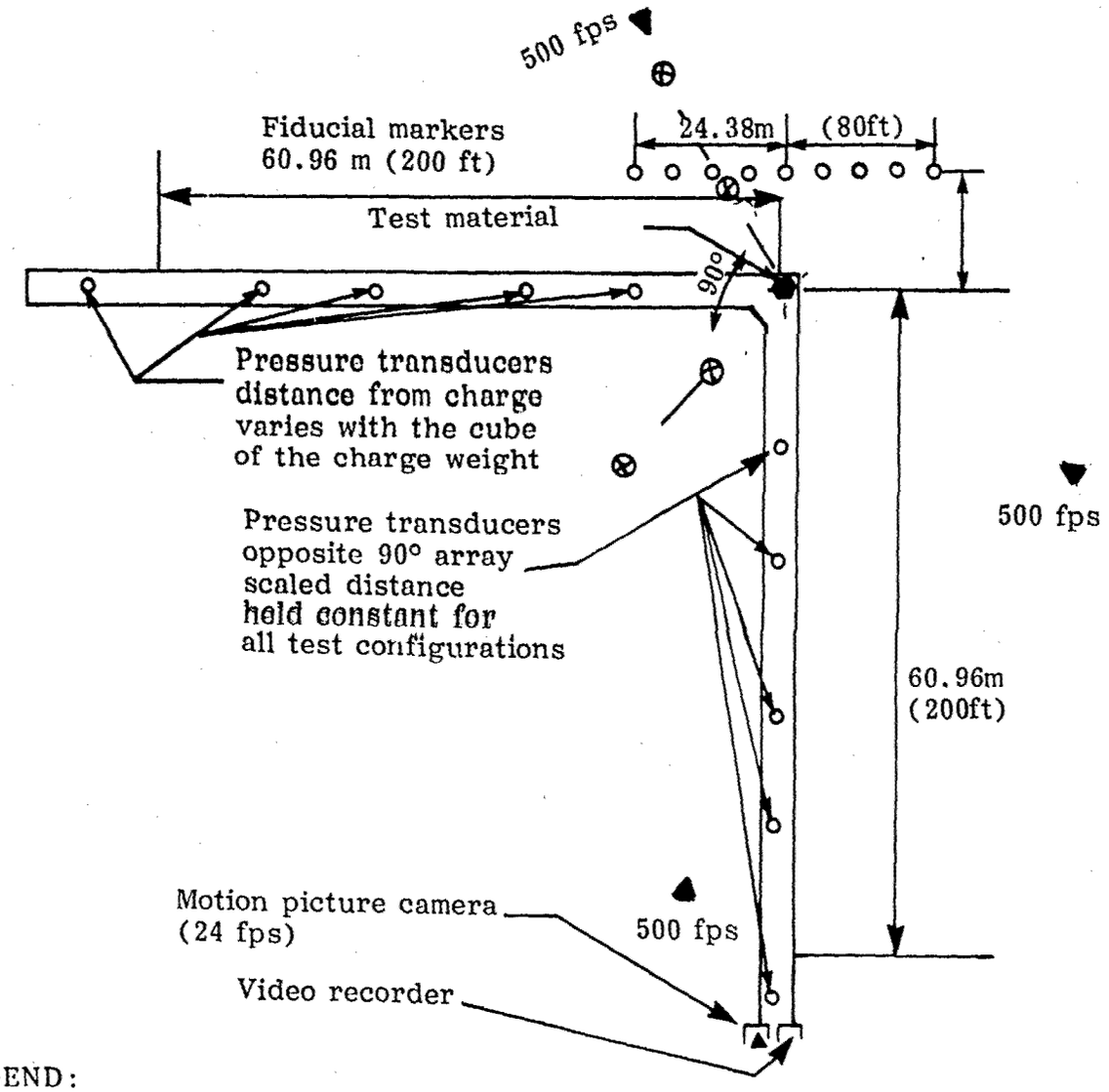


Figure 2. Typical external fire stack test configuration

INSTRUMENTATION

Overpressure instrumentation using 12 side-on pressure transducers as shown in figure 3 were utilized for the single package test configuration. Eight transducers were used for the external fire stack test. Radial distance for each transducer is given in table 1. Distances were calculated to correspond to scaled distances of 1.19, 1.59, 1.98, 3.97, 6.74 and 17.85 m/kg$^{1/3}$ (3, 4, 5, 10, 17 and 45 ft/lb$^{1/3}$) for the external fire stack test. Each transducer is calibrated before each



LEGEND:

- ● Test article
- ○ Pressure transducer
- ⊗ Heat flux gages (15.24 and 30.48 m (50 and 100 ft)
- ▲ Motion picture camera (3 each 500 frame per second (fps) and 1 24 fps)

Figure 3. Typical instrumentation setup

test series using a solenoid-actuated air pressure calibration fixture, adjusted to correspond to overpressure equal to 100% of hemispherical surface bursts of TNT[2]. Signal line continuity and channelization are checked prior to each test.

Table 1. Transducer calibration and placement

Channel number	Scaled distance $m/kg^{1/3}$ ($ft/lb^{1/3}$)	Full scale calibration pressure kPa (psi)	Scaled calibration pressure kPa (psi)	Radial distance meter (ft)	
				Charge * weight 113.4 kg (250 lb)	Charge ** weight 567 kg (1250 lb)
1,2	1.19 (3.00)	2068 (300)	1034 (150)	5.76 (18.90)	N/A
3,4	1.59 (4.00)	1034 (150)	517 (75)	7.68 (25.20)	N/A
5,6	1.98 (5.00)	690 (100)	345 (50)	9.60 (31.50)	16.42 (53.86)
7,8	3.97 (10.00)	138 (20)	69 (10)	19.20 (63.00)	32.83 (107.72)
9,10	6.74 (17.00)	69 (10)	34.5 (5)	32.68 (107.09)	55.82 (183.13)
11,12	17.85 (45.00)	13.8 (2)	6.9 (1)	86.40 (283.48)	147.75 (484.75)

* Single package configuration
** Fire stack test configuration

Temperature measurements using 22 gage Chromel/Alumel thermocouples were affixed external to the drum and a second thermocouple was placed inside the drum 25.4 mm (1 in) above the initiator. An ice point reference junction was coupled to a Honeywell Model 1858 Visicorder. Temperature readout was realtime direct. Temperature measurements were taken only during the single package tests.

Thermal radiation data establish the intensity, duration and spatial characteristics as functions of material, size of combustion zone and burning rate to determine the distance required to obtain a value of 0.3 calories per square centimeter per second from the source of the material. Keithley Model 8602 Micro-Foil ® heat flow sensors were positioned at 15.24 m (50 ft) and 30.48 m (100 ft) in two 90° arrays from the test article. The sensors were coupled to Keithley Model 860 heat flow meter via underground cabling to the Honeywell Model 1858 Visicorder for realtime readout.

Motion picture coverage consisted of three Model H516-E4 Mitchell cameras operating at 500 frames per second (fps) and one Model H516-E4 Mitchell camera operating at 24 frames per second. Locations of cameras are shown in figure 3.

A video recorder was also utilized to tape the event. Before and after color still photographs were taken of each test showing typical setup and posttest results. Standard meteorological data were recorded for each test.

RESULTS

DATA ANALYSIS

Data analysis for end-item stores is based upon the "Go/No-Go" results of the prescribed tests as outlined in the INTEREG, Transport of Dangerous Goods, 1981 Edition, Chapter 4, paragraphs 4.5.1, figure 4.3, and TB 700-2, Department of Defense Explosives Hazard Classification Procedure.[3]

The flowchart for interpretation of test series 6 is shown in figure 4.

TEST RESULTS

Appendix A shows the particle size analysis, moisture content and purity as supplied by Thiokol. Appendix B contains the data sheet for all tests with pertinent measured parameters. Table 2 gives the results of the sampling for particle size and moisture content performed by this test agency and compared with the Thiokol data. The results of the single package test with and without confinement are shown in table 3 and the results of the external fire stack test are in table 4.

DISCUSSION

Particle size analyses were in general agreement with the Thiokol data. Any differences may be attributable to transportation or material handling where additional shearing or grinding might have occurred. Sampling technique may also account for the minor differences. Moisture analyses were somewhat different from the Thiokol data. Differences noted are attributable to different sampling techniques as well as the humidity difference between the test site (60% RH) and the processing location. Comparisons of results are given in table 2.

A total of six type 6a, single package tests were conducted with a minimum of 1 m (3.28 ft) of sand bag confinement. The first three tests used a S94 squib and 56.7 g (2 oz) of FFF black powder as the ignition source, and the remaining three tests employed a number 8 blasting cap as the initiation source. Figures 5 and 6 show the typical test setup. Figure 5 shows the drum before total confinement and figure 6 shows total confinement before ignition/initiation. The results of all six tests were similar. Upon ignition/initiation, white smoke was visible within five seconds; a red/orange smoke was visible near the lid of the drum after approximately one minute. Within 18 to 20 minutes there was an increase of red/orange smoke lasting 30 to 45 seconds. The average total thermal decomposition time for each drum was 27 minutes.

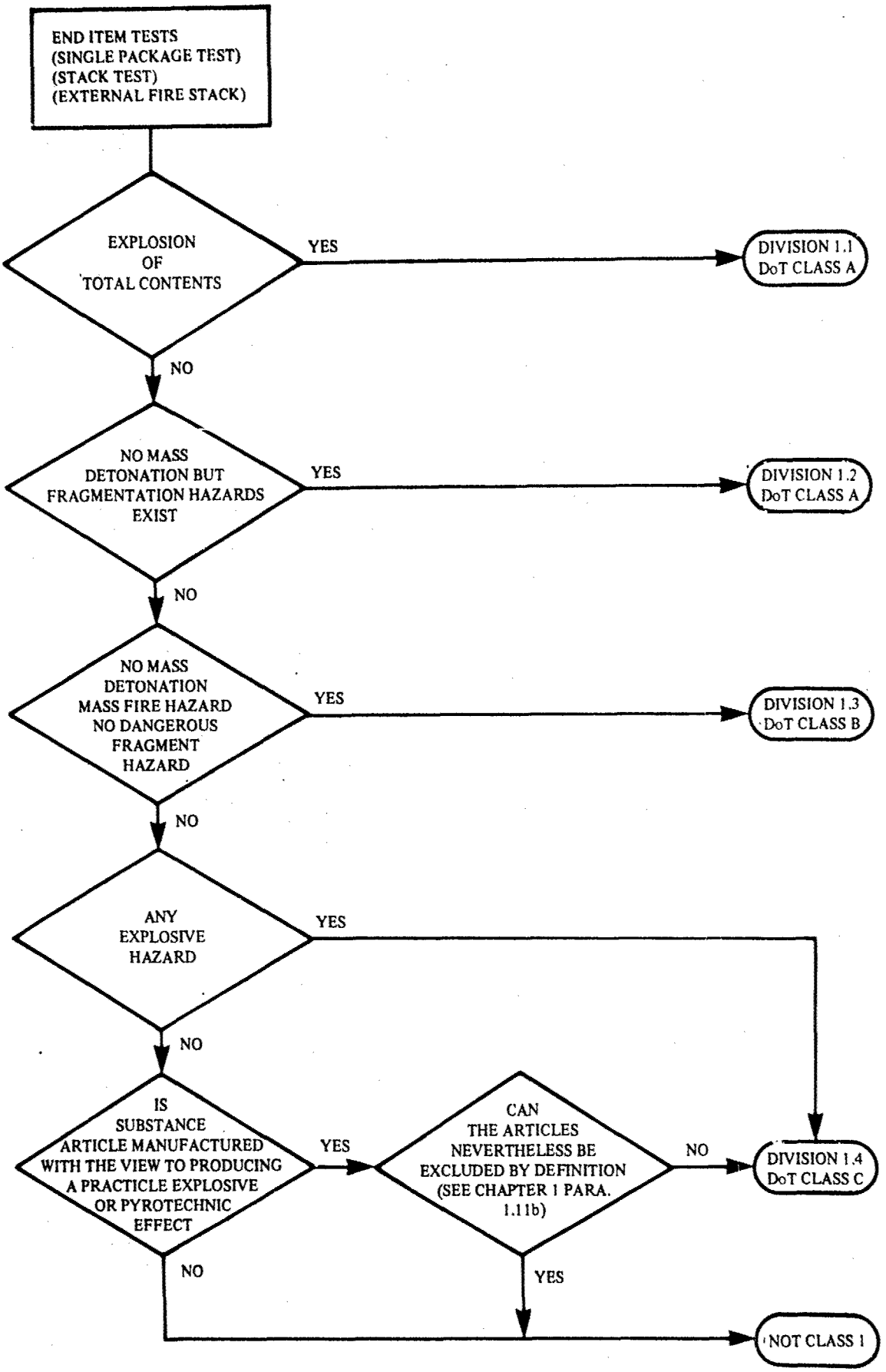


Figure 4. Interpretation of test results

Table 2. Comparison of results for particle size and moisture analyses

Container	Sieve size U.S. standard (micron) 50 (297)	100 (147)	140 (105)	200 (74)	Moisture content (%)
	*Percent by weight of material held on each sieve				
1	5 (8)	67 (79)	87 (94)	97 (99)	0.013 (0.02)
2	8 (6)	74 (76)	92 (91)	100 (97)	0.015 (0.03)
3	7 (6)	70 (73)	88 (90)	97 (94)	0.014 (0.002)
5	7 (7)	72 (77)	90 (92)	98 (97)	0.014 (0.007)
8	7 (9)	71 (82)	90 (94)	98 (94)	0.011 (0.04)
9	7 (7)	71 (78)	91 (93)	98 (94)	0.013 (0.08)
10	7 (7)	72 (76)	90 (91)	98 (95)	0.013 (0.07)
11	7 (6)	71 (74)	91 (91)	98 (97)	0.013 (0.02)
12	7 (8)	72 (78)	90 (93)	98 (97)	0.013 (0.05)
13	8 (7)	73 (80)	90 (93)	98 (96)	0.012 (0.02)
15	7 (7)	72 (76)	90 (91)	98 (97)	0.013 (0.09)
16	6 (6)	70 (73)	91 (91)	98 (94)	0.014 (0.02)

Note: Top values reported by Thiokol.
Values in parenthesis are those determined by NSTL.

Figure 5. Single package setup before total confinement

Figure 6. Single package setup with total confinement

Table 3. Single package test results

Material	Ignition/initiation method	Confinement	Results
113.4 kg Ammonium perchlorate in steel drums	S94 squib and 56.7 g black powder	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
113.4 kg Ammonium perchlorate in steel drums	S94 squib and 56.7 g black powder	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
113.4 kg Ammonium perchlorate in steel drums	S94 squib and 56.7 g black powder	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
113.4 kg Ammonium perchlorate in steel drums	Number 8 blasting cap	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
113.4 kg Ammonium perchlorate in steel drums	Number 8 blasting cap	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
113.4 kg Ammonium perchlorate in steel drums	Number 8 blasting cap	1 m (3.28 ft) Sand bags	No explosion, drum body intact, no explosive hazard
113.4 kg Ammonium perchlorate in steel drums	S94 squib and 56.7 g black powder	None	No ignition of material, lid relieved, no fragmentation, no explosive hazard

There were no overpressures detected in any of the single package tests. There was no fragmentation from any of the drums. Heat flux values were negligible--less than 0.02 Cal/(cm^2·s) at 15.24 m (50 ft) and 0.007 Cal/(cm^2·s) at 30.48 m (100 ft). The heat flux values were several orders of magnitude less than the 0.3 Cal/(cm^2·s) at or beyond a 30.48 m (100 ft) radius that is being considered for Division 1.4 material by the UN Committee of Experts on the Transportation of Dangerous Goods. Figures 7 and 8 show typical posttest results for the confined single package tests. The lid remained on the top of the drum, but it was usually bent. The drum was discolored from the heat but was not ruptured, split, fragmented, or even significantly deformed. In short, the drums were in good enough condition that if repainted and provided with new lids and closures they could have been reused. There was no warping or any deformation of the witness plate, and the only effect of these tests on the plate was a discoloration where the drum sat. Residue found in the drum was desiccant material.

Figure 7. Typical single package test results showing burned sand bags

Figure 8. Typical single package test results showing drum and lid

Results of the single package test without confinement were different from the tests under confinement. Upon initiation, the lid of the drum relieved. The lid went approximately 6.1 m (20 ft) in the air and landed approximately 3.05 m (10 ft) from the drum. None of the ammonium perchlorate ignited. Some material was spilled on the ground as the result of S94 and black powder ignition. Figure 9 shows the test results.

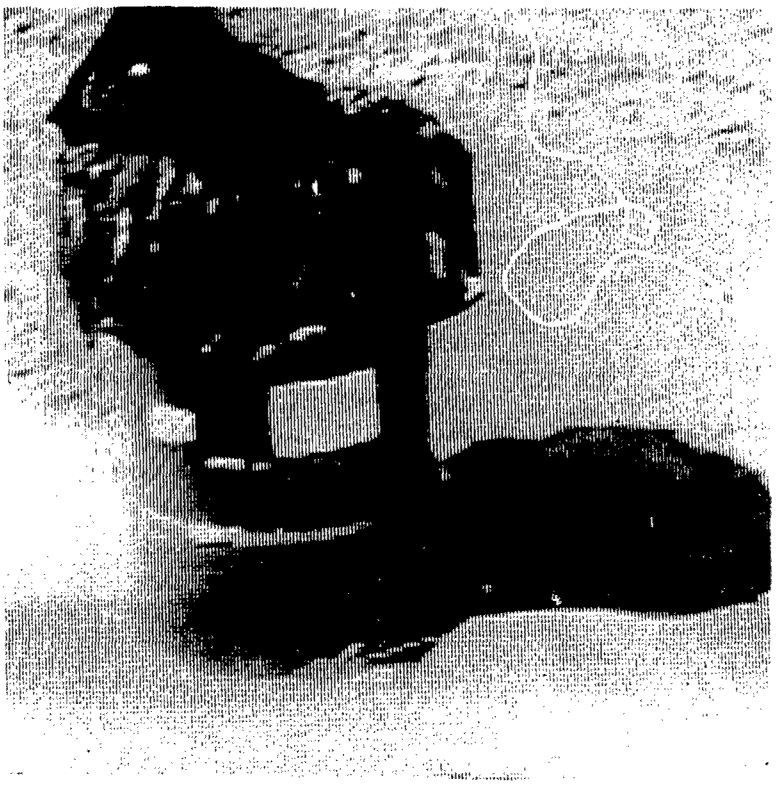


Figure 9. Posttest results of unconfined single package test

The external fire stack test configuration with all of the lumber in place is shown in figure 10. Figure 11 shows the posttest results. Following ignition of the lumber and visual observation of a sustained fire, the lids of individual drums began to relieve starting at approximately 42 seconds following ignition for the first lid and finishing at 84 seconds after ignition for the lid of the fifth drum. The ammonium perchlorate burned until approximately the 5-minute mark when the majority of the material had been consumed. The reaction was more intense for a period of approximately 30 seconds during the 5-minute burn. The wood fire burned substantially longer than the 30 minutes required by the test procedures. There was no explosion, no rupture, splitting, or fragmenting of the drums, and the fire effects were minimal. The drums were still intact and sitting on the steel crib at the end of the tests. Lids from the drums were all close by with the furthest being 9.1 m (30 ft) from the drums. Test results are given in table 4.

Table 4. External fire stack test results

Material	Ignition method	Confinement	Results
5 each 113.4 kg ammonium perchlorate in steel drums 567 kg (1250 lb) total weight	2 each electric matches with 56.7 g black powder 180° apart at base of steel crib	Steel banded	No explosion, drum body intact, no explosive hazard

CONCLUSIONS

Based upon test results of the single package and external fire stack tests and interpretation of results as outlined in figure 4.3 of the INTEREG procedures and paragraph 6.5 of DoD Explosives Hazard Classification Procedure, TB 700-2[3], there are no indications that ammonium perchlorate with nominal particle size of 200 microns exhibited explosive behavior. Specifically:

1. There was no explosion, no overpressure detected, no rupture, splitting, or fragmenting of drum bodies, and no radiant heat hazard, during the 6a, single package tests.

2. There was no mass detonation, no fragmentation, no mass fire effect, and little or no damage to the shipping drums as a result of the 6c, external fire stack test.

3. Ammonium perchlorate did not react when primed by a S94 squib and 56.7 g (2 oz) of FFF black powder without confinement.

4. There was no explosive hazard exhibited during any of the tests performed.

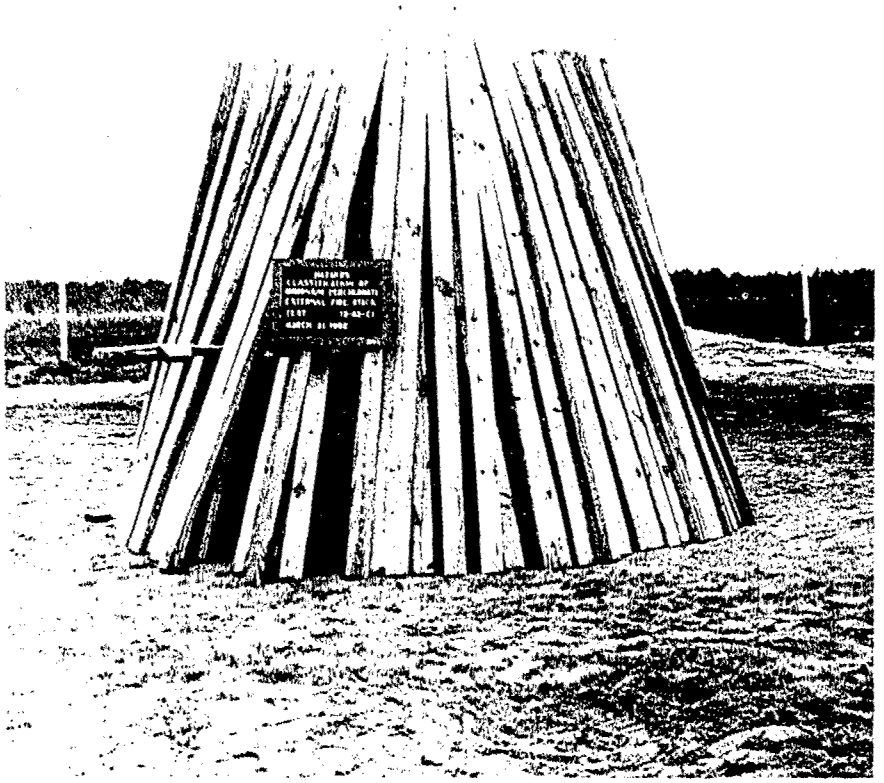


Figure 10. External fire stack test setup with lumber in place

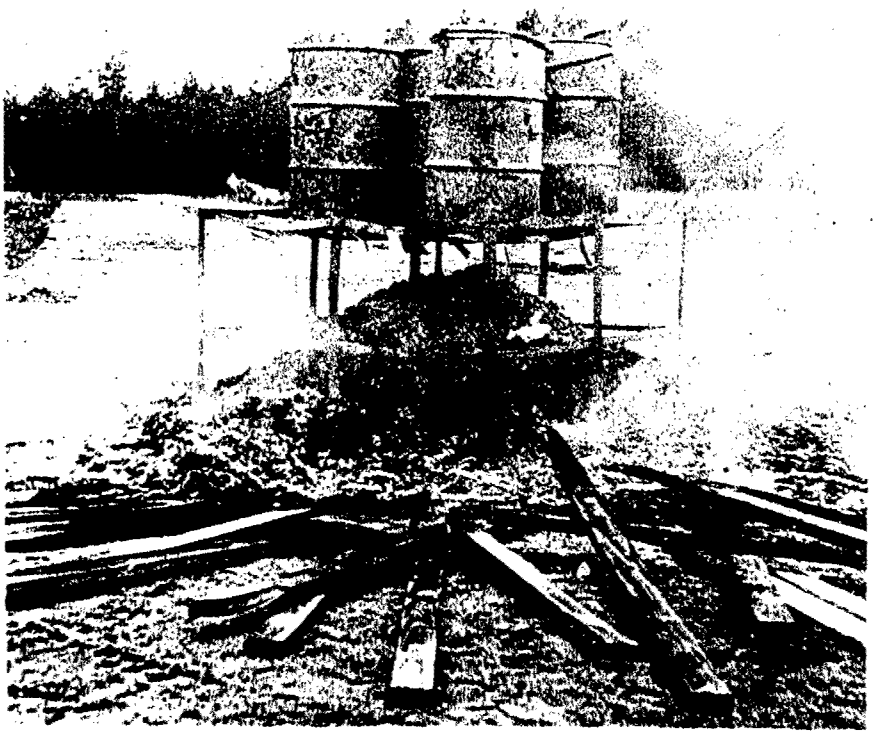


Figure 11. External fire stack test results

REFERENCES

1. INTEREG, Transportation of Dangerous Goods, 1981 Edition.

2. TNT Hemisphere Reference Data, ARRADCOM (DRDAR-LCM-SP).

3. Department of Defense Explosives Hazards Classification Procedures, TB 700-2, March 1981.

4. 49 CFR 178.131, Specification for 37A-350 20-Gage Steel Drum.

APPENDIX A

ACTION PLANS

INSPECTION PLANS

TEST DATA FOR AP SHIPPED TO ARMY

7229-0013

WASATCH DIVISION

CTION PLAN

PO NO.	RECEIVING RPT NO.	VENDOR NO.	PAGE
			1 OF 4

ITEM NO.	REV	IP REV	CHARGE NO.	INDICATOR NO.	NOMENCLATURE
STW2602	A		FA57R	00	AMMONIUM PERCHLORATE

SYSTEM	PROJ	TASK	S/TASK	EFFECTIVITY FROM	TO	USE	NEXT ASSY
SHUTTLE	FE501	04	03			SPECIAL	

Item No	MC	A	I	CODE	DESCRIPTION	DWG ZONE OR SPEC	INSPECTION METHOD	INSPECTION SPEC	OPER NO.	DATA	STAMP AND DATE
					Per AO FE5-789 the following work will be accomplished.					(Bin # 7209)	
001					Upon notification from Manufacturing, a thief sample will be taken from each of the 16 containers.						T 14623 W 6 MAR 1982
002					Verify total moisture conforms to STW4-2602, Table I. Test per STW4-2602 Para 4.6.2 and SLP 621 Para 4.0. Record actuals.	STW4-2002 SLP621 Issue 2 Amend 2A	SMI	0.06 max		Container 1 0.013 Container 2 0.015 Container 3 0.014 Container 4 0.013 Container 5 0.014 Container 6 0.013 Container 7 0.013 Container 8 0.011 Container 9 0.013 Container 10 0.013 Container 11 0.013 Container 12 0.013 Container 13 0.013 Container 14 0.011 Container 15 0.013 Container 16 0.014	T 15177 W 8 MAR 82

APPROVED (QUALITY ENGR)	DATE	APPROVED (PROJ ENGR)	DATE	APPROVED (PROGRAM MGR)	DATE
[signature]	2-3-81				

82 (illegible)

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OPER NO.	DESCRIPTION	DWG CONT. OR SPEC	INSPECTION METHOD	INSPECTION SPEC	OPER NO.	DATA	STAMP AND DATE
003	Verify internal moisture conforms to STW4-2602, Table I. Test per STW4-2602 Para 4.6.4 and SLP 621 Para 4.0. Record actuals.	STW4-2602 SLP621 Issue 2 Amend 2A	SMI	0.04 max		Container 1 0.006 Container 2 0.008 Container 3 0.007 Container 4 0.007 Container 5 0.007 Container 6 0.007 Container 7 0.007 Container 8 0.006 Container 9 0.007 Container 10 0.007 Container 11 0.006 Container 12 0.006 Container 13 0.006 Container 14 0.006 Container 15 0.007 Container 16 0.007	T 15177 W 8 MAR 82
004	Verify external moisture conforms to STW4-2602, Table I. Test per STW4-2602 Para 4.6.3 and SLP 621 Para 4.0. Record actuals.	STW4-2602 SLP621 Issue 2 Amend 2A	SMI	0.02 max		Container 1 0.007 Container 2 0.007 Container 3 0.007 Container 4 0.006 Container 5 0.007 Container 6 0.006 Container 7 0.005 Container 8 0.005 Container 9 0.006 Container 10 0.006 Container 11 0.007 Container 12 0.007 Container 13 0.006 Container 14 0.005 Container 15 0.006 Container 16 0.006	T 15177 W 8 MAR 82

INSPECTION PLAN (CONT)

DRAWING NO.	REV	IP REV	PAGE
STW4-2602	A		3 of 4

ITEM NO.	U/T	CAT	INSP CODE	DESCRIPTION	DWG ZONE OR SPEC	INSPECTION METHOD	INSPECTION SPEC	OPER NO.	DATA	STAMP AND DATE
005				Verify particle size distribution is acceptable. Test per STW4-2602 Para 4.6.14 and SLP 621 Para 17.0. Record cumulative percent retained on each respective sieve. Record actuals on the attached data sheet.	STW4-2602 SLP621 Issue 2 Amend 2A	SMI				(T 15177 W) 8 MAR '82
006				Verify perchlorate as ammonium perchlorate is acceptable. Test per STW4-2602 Para 4.6.12 and SLP 621 Para 14.0. Record actuals.	STW4-2602 SLP621 Issue 2 Amend 2A	SMI	98.3 min		Container 1 98.6 Container 2 98.6 Container 3 99.3 Container 4 99.0 Container 5 99.2 Container 6 98.9 Container 7 98.5 Container 8 99.7 Container 9 98.0 Container 10 99.2 Container 11 99.1 Container 12 98.8 Container 13 99.0 Container 14 99.2 Container 15 98.8 Container 16 99.1	(T 15177 W) 8 MAR '82
007				When IP is complete, attach Receiving Inspection Plan for 7229-0013 and forward to the following: Lee Davis M/S 243D Lee Bailey M/S 701 John Loosle M/S 920 Dave Puskedra M/S 913B						

DATA SHEET
(FOR ITEM 005)

Container	No. 40 Sieve 0-4	No. 50 Sieve 3-11	No. 70 Sieve 13-43	No. 100 Sieve 50-86	No. 140 Sieve 85-98	No. 200 Sieve 97-100
1	0	5	40	67	87	97
2	0	8	40	74	92	100
3	0	7	39	70	88	97
4	0	7	42	74	93	98
5	0	7	41	72	90	98
6	0	7	41	74	93	98
7	0	8	43	73	90	98
8	0	7	39	71	91	98
9	0	7	39	71	91	98
10	0	7	41	72	90	98
11	0	7	36	71	91	98
12	0	7	41	72	90	98
13	0	8	42	73	90	98
14	0	7	39	71	91	98
15	0	7	41	72	90	98
16	0	6	37	70	91	98

ORIG. LOT Acceptance DATA 7224-C013

MM412.1A DATE 03/16/81 I N S P E C T I O N P L A N R I P (TYPE R) PAGE 1

CONTRACT: FE SPACE SHUTTLE

VENDOR IDENT NO : 551439
RECEIVING REPT NO: 1-06686
PURCHASE ORDER NO: ----------

ENGR DOC NO.	DOCUMENT DESCRIPTION	NEXT ASSEMBLY	LVL	ORIGINATOR
STW4-2602	AMMONIUM PERCHLORATE	00	00	G HENDRY

CONFIGURATION DATA / EFFECTIVITY DATA

PART/STOCK NUMBER	DOC REV 1	E C O S / S C N S 2 3 4	T 5	RV 6	FROM 7	THRU 8	W-B-S	CHARGE NO.	INDICATOR NO.
7229	A	SCN 2	R	07	LOT0013	LOT0013	FE5010403	FE04T	
			R	07	LOT0014	LOT0014	FE5010403	FE04T	
			R	07	LOT0029	LOT0030	FE5010403	FE04T	
			R	07	LOT0032	LOT9999	FE5010403	FE04T	

81-01734

23

JUL 17 1981

JUL 17 1981

ADSR

M4:2.1A DATE 03/16/81 I N S P E C T I O N P L A N R I P (TYPE R)

CONTRACT
E SPACE SHUTTLE

PART/STOCK NO. 7229 PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013 ST RV 07

ITEM NO.	DWG/ CAT ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0200	6	VISUAL		9114		C				T 15185 VI	25 JUN 1981
RECORD THIOKOL STOCK/LOT NO.							L/N 2229-0013				
RECORD SUPPLIER LOT NO.							L/N 5061				
RECORD DATE MANUFACTURE							1/__/81 (MO/DA/YR)				
RECORD QUANTITY RECEIVED							QTY 1189700				
0205				9114		C				T 15185 W	25 JUN 1981
RECORD VENDOR NAME							Kerr McGee				
RECORD VENDOR NUMBER							5514313				
RECORD P.O. NUMBER							6613016 I-19211 I-18041				
RECORD RECEIVING REPORT NO.							I-0666362, I-13753, I-14295, I-15055, I-15613				
0210	6	VISUAL		9114		D				T 15185 VI	31 MAR 1981
RECORD SPECIFICATION, REV AND SCN TO WHICH MATERIAL WAS MANUFACTURED.							SPEC STW4-2602 REV A SCN 2				
RESOURCES: P STW4-2602							Re: Sq# 6852				

24

81-01734

CONTRACT: FE SPACE SHUTTLE
PART/STOCK NO.: 7229
PART/STOCK DESCRIPTION: AMMONIUM PERCHLORATE
SERIAL/LOT: LOT0013 LOT0013
ST RV: 07

ITEM NO.	DWG/ CAT ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C SPECS/LIMITS	ACCS	SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0215		9114									

VERIFY EACH SHIPPING CONTAINER IS PROPERLY SEALED PER PDL REQUIREMENTS

0216		9114									

RECORD CONTAINER NUMBERS FOR THIS

25

MATERIAL LOT

8109	7613	7523	8935	7047	7800	8877	
7097	8719	9049	8031	8521	8926	8682	
7783	8429	8995	7813	8892	7588	7186	
8456	9178	7712	9102	8384	9107	7295	
8700	7329	7686	7209	0068	7456	8637	
7758	8070	8396	7527	7764	7488	7610	
8943	7178	8196	7338	8424	8813	7354	
8101	7562	8110	9011	7050	8582	7274	
8647	8158	7552	8295	8061	8529	9140	
8867	8420	8651	7160	8981	7220	8312	
8372	7693	7344	7734	7281	7033	9120	
8530	9160	8225	8260	8103	8346	7603	
7687	7160	8320	7198	8185	8279	8208	
7359	9202	8041	7997	7581	8696	7415	
7061	8159	7639	7857	7558	8078	8013	
9116	8520	9096	7359	8971	7798	7132	
7772	7971	8105	7052	7196	7754	7954	
8096	8414	7820	7187	8378	7516	8153	
7182	7040	8346	9128	9038	7739	8430	
7304	8361	7009	7256	1008	7819	8001	
7462	8064	8376	2436	8189	7971	9030	
8468	9026	8983	8743	7017	7991		
8967	7655	9135	8297	7695	8149		
7245	8075	8214	9124	7158	7188		
	2084	7014	2431	9147			
			7510				
			7780				

81-C113-1

CONTRACT	PART/STOCK NO.	PART/STOCK DESCRIPTION	SERIAL/LOT	ST RV
FE SPACE SHUTTLE	7229	AMMONIUM PERCHLORATE	LOT0013 LOT0013	07

ITEM NO.	DWG/ CAT ZONE	METHODS	Q A C/C	MFG C/C	ACCS	INSTRUCTIONS / SPECS/LIMITS	SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
								8258 8908	8922	8030	7984	
								8610 8111	8636	7741	7535	
								7859 8325	7743	7625	7792	
								8883 7789	9085	7851	7111	25 JUN 15165 VOID TW
								8552 7407	8840	7970	[illegible]	
								8581 7956	7243	9042	7062	
								8891 7969	9803	9079	7863	
								8921 7070	7450	7054	8403	
								8298 8493	8613	8909	7521	
								7938 7163	9197	8477	8041	
								7079 7845	7333	7341	7922	
								7510 7154	7326	7544	9160	
								8918 8047	7586	8168	8732	
								7769 7597	8338	8500	7811	
								7830 8398	7847	7635	7031	
								7616 8608	7121	8639	8808	
								8648 7546	7607	7034	7076	
								8237 7957	7537	9057	7567	
									8457	8686	8787	
0220	6	VISUAL	9114								14629 W	18 MAR 1921

INSPECT FOR IDENTIFICATION AND
VERIFY SERIAL NUMBER IS LEGIBLE.

26

81-01734

CONTRACT	PART/STOCK NO.	PART/STOCK DESCRIPTION	SERIAL/LOT	ST RV
FE SPACE SHUTTLE	7229	AMMONIUM PERCHLORATE	LOT0013 LOT0013	07

ITEM NO.	DWG/ CAT	ZONE	METHODS	Q A C/C	MFG C/C	ACCS	ADCAR SR TYPE	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
	INSTRUCTIONS				SPECS/LIMITS		DATA RECORDING				

0225 9114

INSPECT FOR SHIPPING DAMAGE AND THE FOLLOWING SHALL BE CHECKED:
A. VERIFY CONTAINERS ARE FREE OF CRACKS
B. VERIFY LIDS AND CLAMPS ARE UNDAMAGED
C. VERIFY THERE ARE NO PUNCTURES IN THE CONTAINER.
NOTE: BIN DEFICIENCIES WHICH HAVE ALLOWED THE MATERIAL TO BE DAMAGED SHALL BE DOCUMENTED ON AN IRR.

27 BIN DEFICIENCIES WHICH MAY ALLOW THE MATERIAL TO BE DAMAGED SHALL BE DOCUMENTED ON A DL.

BIN DEFICIENCIES WHICH DO NOT HAVE AN EFFECT ON THE QUALITY OF THE CONTENTS SHALL BE DOCUMENTED ON ECON-O-BIN TRAVELER (TC NO. 1665).

0230 6 VISUAL 9114

EACH VENDOR SAMPLE SHALL BE TREATED AS A CONTAINER. EACH DRUM CONTAINING VENDOR SAMPLES MUST HAVE A MINIMUM OF ONE SAMPLE USED FROM THAT DRUM AND SAMPLED PER PARA 4.2 TABLE II.

81-01734

MM312.10 DATE 03/16/81

I N S P E C T I O N P L A N R I P (TYPE R)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229
PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE
SERIAL/LOT LOT0013 LOT0013
ST RV 07

ITEM NO.	DWG/ CAT ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C SPECS/LIMITS	ADCAR SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	BUY OFFS MFG DATE	BUY OFFS QA STP	BUY OFFS QA DATE
				9114						

12339 MAR 18 81

VERIFY DELIVERED SOURCE SAMPLES FROM VENDOR ARE IN COMPLIANCE WITH PARA 4.2.3.
RECORD NUMBER OF BULK CONTAINERS IN LOT 264
RECORD NUMBER OF VENDOR SOURCE SAMPLES RECEIVED. 264
NOTE: NUMBER OF BULK CONTAINERS AND NUMBER OF SAMPLES RECEIVED MUST BE EQUAL.

RESOURCES: P STW4-2602

00937 MAR 20 81

0250 6 VISUAL 9114

COMPOSITE SAMPLES PER STW4-2602 PARA 4.2
RECORD SAMPLE IDENTIFICATION NUMBERS IN EACH COMPOSITE

COMPOSITE 1: 29, 30, 53, 59, 76, 81, 90
COMPOSITE 2: 112, 120, 139, 143, 150, 175, 180
COMPOSITE 3: 201, 208, 235, 240, 258, 263

RESOURCES: P STW4-2602

28

81-01734

3412:1A DATE 03/16/81 INSPECTION PLAN RIP (TYPE R)

CONTRACT
E SPACE SHUTTLE

PART/STOCK NO. 7229 PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013 ST RV 07

ITEM NO.	DWG/ CAT ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C SPECS/LIMITS	ADCAR SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	BUY OFFS MFG DATE	BUY OFFS QA STP	BUY OFFS QA DATE
0260	C	SMI		9114		D			15223	24/Mar/81

VERIFY TOTAL MOISTURE CONFORMS TO 0.06 MAX

Comp 1 -.02
2 -.02
3 -.02
AVE -.02

STW4-2602, TABLE I.
TEST PER STW4-2602 PARA 4.6.2 AND
SLP 621 PARA 4.0.
RECORD ACTUAL, INDIVIDUAL & AVERAGE.
RESOURCES: P STW5-2602
P SLP621 ISSUE 2
AMEND 2A

ITEM NO.	DWG/ CAT ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C SPECS/LIMITS	ADCAR SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	BUY OFFS MFG DATE	BUY OFFS QA STP	BUY OFFS QA DATE
0270	C	SMI		9114		D			15223	24/Mar/81

VERIFY INTERNAL MOISTURE CONFORMS TO 0.04 MAX

-.01
-.02
-.01
AVE -.01

STW4-2602, TABLE I. TEST PER STW4-2602
PARA 4.6.4 AND SLP 621 PARA 4.0.
RECORD ACTUALS, INDIVIDUAL AND AVERAGE.
RESOURCES: P STW4-2602
P SLP621 ISSUE 2
AMEND 2A

81-01734

AM413.1A DATE 03/16/81 INSPECTION PLAN RIP (TYPE R)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229 PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013 ST RV 07

ITEM NO.	DWG/ CAT	ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0280	6		SMI		9114			D		15223 W	24Mar81		
VERIFY EXTERNAL MOISTURE CONFORMS TO						0.02 MAX			-.01 -.01 -.01 AVE -.01				
STW4-2602, TABLE I. TEST PER STW4-2602 PARA 4.6.3 AND SLP 621 PARA 4.0. RECORD ACTUALS, INDIVIDUAL AND AVERAGE. RESOURCES: P STW4-2602 P SLP621 ISSUE 2 AMEND 2A													
0290 30	C		SMI		9114			D		15223 W	24Mar81		
VERIFY PHOSPHATE AS TCP, CONFORMS TO						0.10 - 0.25			-.16 -.14 -.15 AVE -.15				
STW4-2602, TABLE I. TEST PER STW4-2602 PARA 4.6.13 AND SLP 621 PARA 15.0. RECORD ACTUALS, INDIVIDUAL AND AVERAGE. RESOURCES: P STW4-2602 P SLP621 ISSUE 2 AMEND 2A													

81-01734

CONTRACT	PART/STOCK NO.	PART/STOCK DESCRIPTION	SERIAL/LOT	ST RV
FE SPACE SHUTTLE	7229	AMMONIUM PERCHLORATE	LOT0013 LOT0013	07

ITEM NO.	DWG/ CAT ZONE	METHODS	Q A C/C	MFG C/C	ACCS	ADCAR SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	BUY OFFS MFG DATE	BUY OFFS QA STP	BUY OFFS QA DATE
	INSTRUCTIONS			SPECS/LIMITS							
0300	A	SMI		9114			D				

VERIFY PARTICLE SIZE DISTRIBUTION IS ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.14 AND SLP 621 PARA 17.0. RECORD CUMMULATIVE PERCENT RETAINED ON:

		Comp 1	Comp 2	Comp 3	Ave
NO. 40 SIEVE	0-4	0	0	0	0
NO. 50 SIEVE	3-11	6	6	6	6
NO. 70 SIEVE	13-43	37	39	36	37
NO. 100 SIEVE	50-86	66	71	68	68
NO. 140 SIEVE	85-98	89	92	89	90
NO. 200 SIEVE	97-100	97	98	97	97

RESOURCES: P STW4-2602
P SLP621 ISSUE 2 AMEND 2A

81-01734

CONTRACT	PART/STOCK NO.	PART/STOCK DESCRIPTION	SERIAL/LOT	ST RV
FE SPACE SHUTTLE	7229	AMMONIUM PERCHLORATE	LOT0013 LOT0013	07

ITEM NO.	DWG/ CAT	ZONE	METHODS	Q A C/C	MFG C/C SPECS/LIMITS	ADCAR SR TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	BUY OFFS MFG DATE	BUY OFFS QA STP	BUY OFFS QA DATE
0310	C		SMI		9114					T 15223 W	24Mar81

all normal

VERIFY APPEARANCE IS ACCEPTABLE TO STW4-2602 PARA 3.3.1 TEST PER STW4-2602 PARA 4.6.15 AND SLP 621 PARA 19.0. RECORD RESULTS.

RESOURCES: P STW4-2602
P SLP621 ISSUE 2 AMEND 2A

0320 C SMI 9114 D T 15223 W 24Mar81

VERIFY ACID INSOLUBLES ARE ACCEPTABLE. 0.04 MAX

.004
.002
.004
AVE .003

32

TEST PER STW4-2602 PARA 4.6.5 AND SLP 621 PARA 5.0. RECORD ACTUALS, INDIVIDUAL AND AVERAGE.

RESOURCES: P STW4-2602
P SLP621 ISSUE 2 AMEND 2A

0330 C SMI 9114 D T 15223 W 24Mar81

VERIFY PH OF AQUEOUS SOLUTION IS ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.6 AND SLP 621 PARA 12.0. RECORD ACTUALS, INDIVIDUAL AND AVERAGE. 5.0-6.5

6.4
6.4
6.3
AVE 6.4

RESOURCES: P STW4-2602
P SLP621 ISSUE 2 AMEND 2A

81-01734

MM412:1A DATE 03/16/81 I N S P E C T I O N P L A N R I P (TYPE R)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229 | PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE | SERIAL/LOT LOT0013 LOT0013 | ST RV 07

ITEM NO.	DWG/ CAT	ZONE	METHODS / INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS.	LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0340	C		SMI		9114				D					

VERIFY CHLORIDE AS AMMONIUM CHLORIDE, IS 0.155 MAX

.103
.101
.102
AVE .102

ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.7 AND SLP 621 PARA 8.0. RECORD ACTUALS, INDIVIDUAL AND AVERAGE.

RESOURCES: P STW4-2602
P SLP621 ISSUE 2 AMEND 2A

15223 W 24Mar81

ITEM NO.	DWG/ CAT	ZONE	METHODS / INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS.	LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0350	C		SMI		9114				D					

VERIFY SULFATED ASH AS SODIUM 0.9 MAX

.4
.3
.2
AVE .3

PERCHLORATE IS ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.8 AND SLP 621 PARA 7.0. RECORD ACTUALS, INDIVIDUAL AND AVERAGE.

RESOURCES: P STW4-2602
P SLP621 ISSUE 2 AMEND 2A

15223 W 24Mar81

81-01734

SM12.19 DATE 03/16/81 I N S P E C T I O N P L A N R I P (TYPE R)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229
PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE
SERIAL/LOT LOT0013 LOT0013
ST RV 07

ITEM NO.	DWG/ CAT	ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0360	C		SMI		9114			D					

VERIFY BROMATE AS AMMONIUM BROMATE IS 0.004 MAX

nil
nil
nil
AVE nil

T 15223 W 24Mar81

ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.9 AND SLP 621 PARA 10.0.
RECORD ACTUALS, INDIVIDUAL AND AVERAGE.
RESOURCES: P STW4-2602
P SLP621 ISSUE 2
AMEND 2A

ITEM NO.	DWG/ CAT	ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0370	A		SMI		9114			D					

VERIFY CHLORATE AS AMMONIUM CHLORATE IS 0.02 MAX

.002
.002
.002
AVE .002

T 15223 W 24Mar81

ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.10 AND SLP 621 PARA 23.0.
RECORD ACTUALS, INDIVIDUAL AND AVERAGE.
RESOURCES: P STW4-2602
P SLP621 ISSUE 2
AMEND 2A

81-01734

MR412.1A DATE 03/16/81 I N S P E C T I O N P L A N R I P (TYPE R) PAGE 13

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229

PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013

SI RV 07

ITEM NO.	DWG/ CAT	ZONE	METHODS / INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0380	B		SMI		9114			D					

VERIFY IRON AS FERRIC OXIDE IS ACCEPT- 0.0036 MAX

.0014
.0011
.0017
AVE .0014

ABLE. TEST PER STW4-2602 PARA 4.6.11 AND SLP 621 PARA 14.0.
RECORD ACTUALS, INDIVIDUAL AND AVERAGE.
RESOURCES: P STW4-2602
P SLP621 ISSUE 2
AMEND 2A

15223 W 24Mar81

35

ITEM NO.	DWG/ CAT	ZONE	METHODS / INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	QA STP	QA DATE
0390	C		SMI		9114			D					

VERIFY PERCHLORATE AS AMMONIUM 98.3 MIN

99.0
99.8
99.7
AVE 99.5

PERCHLORATE IS ACCEPTABLE. TEST PER STW4-2602 PARA 4.6.12 AND SLP 621 PARA 14.0.
RECORD ACTUALS, INDIVIDUAL AND AVERAGE.
RESOURCES: P STW4-2602
P SLP621 ISSUE 2
AMEND 2A

15223 W 24Mar81

81-01734

:84:2-10 DATE 03/16/81 I N S P E C T I O N P L A N R I P (TYPE R)

CONTRACT
E SPACE SHUTTLE

PART/STOCK NO. 7229
PART/STOCK DESCRIPTION AMMONIUm PERCHLORATE
SERIAL/LOT LOT0013 LOT0013
ST RV 07

ITEM NO.	DWG/ CAT	ZONE	METHODS / INSTRUCTIONS	Q A C/C	MFG C/C SPECS/LIMITS	ACCS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS MFG STP	MFG DATE	BUY OFFS QA STP	QA DATE
0400		6	VISUAL		9114							T 15186 W	25 JUN 1981
RECORD QUANTITY ACCEPTED AND/OR REJECTED. ACCEPTED REJECTED									1189-100 -0-				
0410		6	VISUAL		9114							T 15186 W	25 JUN 1981
SHELF LIFE: 18 MONTHS FROM MFG. RECORD EXPIRATION DATE RETEST DATE STORAGE: AMBIENT							EX		June/25/82 (MO/DA/YR) June/25/82 (MO/DA/YR)				
0420	36	6	VISUAL		9114							T 15186 W	25 JUN 1981
WHEN RIP IS COMPLETE, ATTACH VIP SUPPLIER DATA AND FORWARD TO MATERIAL REVIEW AND RECORDS.													

E N D O F I N S P E C T I O N P L A N R I P (TYPE R)

81-017341

RR= 1-0636

SQUAWK SHEET PO= 613016

SQUAWK NUMBER	PART NUMBER	SERIAL NUMBER	DATE	AREA/BUILDING NUMBER
No. 685?	7229	0013		
INITIATOR NAME	PART NAME	CPI NUMBER	OPERATION NO.	STEP NO.
	Ammonium Perchlorate			

DESCRIPTION/DEFICIENCY

Material was certified to the STW4-2602 Rev. NC on the Vendor XHX Inspection and is so identified rather than

STW4-2602 Rev A SCN 2

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ROUTED TO

DISPOSITION/CORRECTIVE ACTION	STAMP MFG	STAMP QA	DATE
STW4-2602 Rev A SCN 2 was released with the following effectivity: 7229-0013,0014,0029,0030			
0032 and subq. The specification revision was made to add an alternative method for determining			
chlorate as NH_4ClO_3 and also for perchlorate as well as to clarify the para for delivered source			
samples. These changes were made as a result of a quality audit completed in 1980 wherein it was			
found that alternate methods were utilized by the vendors (Ref. ECR 4610). Either of the H tests			
in the specification are now acceptable. Since there were no material changes made, the corrected			
planning to STW4-2602 Rev A SCN 2 will be sent to the vendor to be completed and certified. The			25 JUN 1981
stenciling of the bins will also require correction.			

DISPOSITIONED BY

DATE 25 March 81

SEE REVERSE SIDE FOR INSTRUCTIONS

DISTRIBUTION: WHITE = SHOP TRAVELER
YELLOW = QC FILE

C/C	REQUESTER	R CT	ENGR DOC NO	PART/STOCK NO.	RV	ST	RV FROM	THRU	ACCS REC REPT
K132	MM-HENDRY	V	FE STW4-2602	7229	06	V	05 LOT0013	LOT0013	

MM412.1A DATE 03/13/81 I N S P E C T I O N P L A N V I P (TYPE V) PAGE 1

CONTRACT: FE SPACE SHUTTLE VENDOR IDENT NO : 000000

ENGR DOC NO.	DOCUMENT DESCRIPTION	NEXT ASSEMBLY	LVL	ORIGINATOR
STW4-2602	AMMONIUM PERCHLORATE	00	00	G HENDRY

PART/STOCK NUMBER	CONFIGURATION DATA DOC REV 1	ECOS/SCNS 2 3 4	EFFECTIVITY DATA T 5	RV 6	FROM 7	THRU 8	W-B-S	CHARGE NO.	INDICATOR NO.
7229	A	SCN 2	V	05	LOT0013	LOT0014	FE5010403	FE04T	
			V	05	LOT0029	LOT0030	FE5010403	FE04T	
			V	05	LOT0032	LOT9999	FE5010403	FE04T	

M4-12-1A DATE 03/13/81 INSPECTION PLAN VIP (TYPE V)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO.
7229

PART/STOCK DESCRIPTION
AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013 ST RV 05

ITEM NO.	DWG/ CAT ZONE METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	VENDOR DATE	QA STP	QA DATE
0010	VISUAL		VEND			C					
	RECORD THIOKOL STOCK/LOT NO.					L/N	7229-0013				
	RECORD VENDOR STOCK/LOT NO.					L/N	5061				
	RECORD QUANTITY OF LOT						1,189,700				
	RECORD DATE OF MANUF.						1 / / 81 (MO/DA/YR)				
0015	QV		VEND			D					
	RECORD SPECIFICATION, REV AND SCN TO WHICH MATERIAL WAS MANUFACTURED.					SPEC REV SCN	STW4-2602 A 2				
	RESOURCES: P STW4-2602										
0020	SMI		VEND			D					
	VERIFY TOTAL MOISTURE CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.2. RECORD RESULTS.			0.06 MAX			0.025 0.023 0.026				
	RESOURCES: P STW4-2602										

MM412.1A DATE 03/13/81 I N S P E C T I O N P L A N V I P (TYPE V)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229

PART/STOCK DESCRIPTION
AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013

ST RV 05

ITEM NO.	DWG/ CAT ZONE METHODS INSTRUCTIONS	Q A C/C	MFG C/C SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	VENDOR DATE	QA STP	QA DATE
0030	SMI		VEND		D	0.019 0.018 0.020		3/13/81		
	VERIFY INTERNAL MOISTURE CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.4. RECORD ACTUALS.		0.04 MAX							
	RESOURCES: P STW4-2602									
0040	SMI		VEND		D	0.006 0.005 0.006		3/18/81		
	VERIFY EXTERNAL MOISTURE CONFORMS TO STW4-2602, TABLE 1 WHEN TESTED TO PARA 4.6.3. RECORD ACTUALS.		0.02 MAX							
	RESOURCES: P STW4-2602									
0050	SMI		VEND		D	0.003 0.003 0.003		3/18/81		
	VERIFY ACID INSOLUBLES CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.5. RECORD ACTUALS.		0.04 MAX							
	RESOURCES: P STW4-2602									

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229

PART/STOCK DESCRIPTION
AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013

ST RV 05

ITEM NO.	DWG/ CAT ZONE METHODS INSTRUCTIONS	Q A C/C	MFG C/C ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	VENDOR DATE	QA STP	QA DATE
0060	SMI VERIFY PH CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.6. RECORD ACTUALS. RESOURCES: P STW4-2602	VEND	5.0 – 6.1		D	6.1 6.1 6.1		3/18/81		
0070	SMI VERIFY CHLORIDE, AS AMMONIUM CHLORIDE, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.7. RECORD ACTUALS. RESOURCES: P STW4-2602	VEND	0.155 MAX		D	0.004 0.004 0.004		3/18/81		
0080	SMI VERIFY SULFATED ASH, AS SODIUM PERCHLORATE, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.8. RECORD ACTUALS.	VEND	0.9 MAX		D	0.38 0.38 0.36		3/18/81		
0090	SMI VERIFY BROMATE, AS AMMONIUM BROMATE, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.9. RECORD ACTUALS. RESOURCES: P STW4-2602	VEND	0.004 MAX		D	0.001 0.001 0.001		3/18/81		

CONTRACT: FE SPACE SHUTTLE
PART/STOCK NO.: 7229
PART/STOCK DESCRIPTION: AMMONIUM PERCHLORATE
SERIAL/LOT: LOT0013 LOT0013
ST RV: 05

ITEM NO.	DWG/ CAT ZONE METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	DATE	QA STP	DATE
0100	SMI VERIFY CHLORATE, AS AMMONIUM CHLORATE, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.10. RECORD ACTUALS. RESOURCES: P STW4-2602	VEND		0.02 MAX	D	0.004 0.004 0.004	Rdm	3/18/81		
0110	SMI VERIFY IRON, AS FERRIC OXIDE, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.11. RECORD ACTUALS. RESOURCES: P STW4-2602	VEND		0.0036 MAX	D	0.0003 0.0003 0.0003	Rdm	3/18/81		
0120	SMI VERIFY PERCHLORATE, AS AMMONIUM PERCHLORATE, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.12. RECORD ACTUALS. RESOURCES: P STW4-2602	VEND		98.3 MIN	D	99.5 99.5 99.5	Rdm	3/18/81		

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229
PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE
SERIAL/LOT LOT0013 LOT0013
ST RV 05

ITEM NO.	OWG/ CAT ZONE	INSTRUCTIONS / METHODS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR	TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	VENDOR DATE	QA STP	QA DATE
0130		SMI		VEND				D				
		VERIFY PHOSPHATE, AS TCP, CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.13. RECORD ACTUALS.			0.10 - 0.25			0.20 0.20 0.20		3/18/81		
		RESOURCES: P STW4-2602										
0140		2		VEND				D				
		VERIFY PARTICLE SIZE DISTRIBTUTION CONFORMS TO STW4-2602, TABLE I WHEN TESTED TO PARA 4.6.14. RECORD ACTUALS (CUMULATIVE PERCENT RETAINED ON).										
		NO. 40 SIEVE			0-4		0.0	0.0				
		NO. 50 SIEVE			3-11		7.2	7.4				
		NO. 70 SIEVE			13-43		40.0	40.3				
		NO. 100 SIEVE			50-86		73.0	74.3				
		NO. 140 SIEVE			85-98		90.8	91.6				
		NO. 200 SIEVE			97-100		99.2	98.9				
								0.0 7.4 37.8 71.2 89.9 98.9		3/18/81		
		RESOURCES: P STW4-2602										
0150		SMI		VEND				NORMAL				
		VERIFY PHOTOMICROGRAPHIC ANALYSIS CONFORMS TO PARA 3.3.1 WHEN TESTED TO PARA 4.6.15. RECORD NORMAL OR ABNORMAL. NOTE: SAMPLE PHOTOGRAPHS MUST BE RETAINED IN THE DATA PACKAGE FOR A MINIMUM OF 5 YEARS.										
		RESOURCES: P STW4-2602										

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229

PART/STOCK DESCRIPTION
AMMONIUM PERCHLORATE

SERIAL/LOT LOT0013 LOT0013

ST RV 05

ITEM NO.	DRG/ CAT ZONE	METHODS / INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	VENDOR DATE	QA STP	QA DATE
0160		VISUAL		VEND					3/18/81		
		VERIFY PACKAGING AND PACKING CONFORM TO STW4-2602 PARA 5.1.									
		RESOURCES: P STW4-2602									
0170		VISUAL		VEND					3/18/81		
		VERIFY SAMPLE CONTAINER PACKING CONFORMS TO STW4-2602 PARA 5.1.1 AND 5.2.									
		RESOURCES: P STW4-2602									
0180		VISUAL		VEND					3/18/81		
		VERIFY SAMPLE CONTAINER MARKING CONFORMS TO STW4-2602 PARA 5.3.									
		RESOURCES: P STW4-2602									
0185				VEND					3/18/81		
		VERIFY DELIVERED SOURCE SAMPLES WERE PREPARED IN ACCORDANCE WITH PARA 4.2.3.									
		RECORD NUMBER OF CONTAINERS IN LOT					264				
		RECORD NUMBER OF CONTAINER SAMPLES SENT TO THIOKOL.					264				
		NOTE: THERE SHALL BE SAMPLES FROM EACH BULK CONTAINER IN MATERIAL LOT.									
		RESOURCES: P STW4-2602									

AM-12-1A DATE 03/13/81 I N S P E C T I O N P L A N V I P (TYPE V)

CONTRACT
FE SPACE SHUTTLE

PART/STOCK NO. 7229
PART/STOCK DESCRIPTION AMMONIUM PERCHLORATE
SERIAL/LOT LOT0013 LOT0013
ST RV 05

ITEM NO.	DWG/ CAT ZONE	METHODS INSTRUCTIONS	Q A C/C	MFG C/C	ACCS SPECS/LIMITS	SR TYPE	ADCAR DATA RECORDING	BUY OFFS VENDOR STP	VENDOR DATE	QA STP	QA DATE
0195		VISUAL		VEND							
		RECORD APPLICABLE INSPECTION REJECTION REPORT NUMBERS.					NONE				
0196		VISUAL		VEND							
		RECORD APPLICABLE OCR NUMBERS FOR EACH PROCESS DEPARTURE					NONE				

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E N D O F I N S P E C T I O N P L A N V I P (TYPE V)

APPENDIX B

DATA SHEET

(Front)

AC/258	NATO DATA CARD AMMUNITION CLASSIFICATION TEST RESULTS	1. SECURITY CLASSIFICATION: UNCLASSIFIED
3. TESTING NATION: USA	5. ADDRESS OF NATIONAL TESTING AUTHORITY:	2. NATO TEST REFERENCE:
4. TESTING SERVICES AND REFERENCE:		
6. NATO STOCK NUMBER:	7. CALIBRE OR WEIGHT:	8. ITEM NAME AND MODEL DESIGNATION: Ammonium perchlorate

9. TYPE OF PACKAGE AND PACKING MATERIALS:

Bulk 113.4 kg (250 lb) quantity in 113.7 l (30 gal) steel drum

10. GROSS WEIGHT OF ITEM (ROUND, BOMB, ETC) KG	11. NUMBER OF ITEMS OF PACKING	12. GROSS WEIGHT OF PACKING	13. TYPES OF EXPLOSIVE	EXPLOSIVES PER ITEM (KG) 14. TOTAL QUANTITY	15. NET QUANTITY FOR COMPUTATION F CD
			(a) BURSTING CHARGES	0	0
			(b) PROPELLANT	250	250
			(c) OTHER EXPLOSIVES	0	0

16. HAZARD DIVISION:	18. AUTHORITY AND DATE:
DoT 5.1	
17. COMPATIBILITY GROUP: Oxidizer	

(Reverse)

19. SINGLE PACKAGE TEST RESULTS	20. STACK TEST RESULTS Not performed NUMBER OF PACKAGES IN TEST:
FIRST TEST: No explosion of total contents, no fragmentation, heat flux at 30.48 m < 0.007 cal/cm^2·sec burning time approximately 22 minutes	FIRST TEST:
SECOND TEST: No explosion of total contents, no fragmentation, heat flux at 30.48 m < 0.007 cal/cm^2·sec, total burn time approximately 28 minutes	SECOND TEST:
THIRD TEST: No explosion of total contents, no fragmentation, heat flux at 30.48 m < 0.007 cal/cm^2·sec, total burn time 28 minutes	THIRD TEST:

21. EXTERNAL FIRE, STACK TEST RESULTS — NUMBER OF PACKAGES IN TEST: 5

No explosion, drum body intact, no explosive hazard.

22. REMARKS:

DISTRIBUTION LIST

Commander
U.S. Army Armament Research
and Development Command
ATTN: DRDAR-CG
DRDAR-LC
DRDAR-LCM
DRDAR-LCM-S (50)
DRDAR-SF
DRDAR-TSS (5)
DRDAR-LCU-P
Dover, NJ 07801

Commander
U.S. Army Materiel Development
and Readiness Command
ATTN: DRCDE, D. Griffin
DRCIS-E
DRCPA-E
DRCPP-I
DRCDI
DRCSG-S
5001 Eisenhower Avenue
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DoD Explosives Safety Board
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U.S. Army Materiel Systems
Analysis Activity
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Aberdeen Proving Ground, MD 21005

Commander/Director
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U.S. Army Armament Research
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DRDAR-CLB-PA
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Ballistics Research Laboratory
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Redstone Arsenal, AL 35898

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Naval Sea System Command
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NAVSEA-G2R22, R. F. Cassel
Crystal Plaza, Bldg 6, Room 806
Washington, DC 20362

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