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2024 Low Explosives Proficiency Test
FTS-24-EXP Summary Report

The Submission Deadline for this test was November 22, 2024

The test was manufactured by FTS at the FTS Laboratory Facility (127 W. Grand River Avenue, Williamston, MI 48895) and all activities were coordinated by Rebecca Smith (rsmith@forsci.com), Proficiency Test Program Manager. Ms. Smith is also authorizing the release of this report. This is the summary report issued on 12/9/24. FTS considers all reports confidential and does not release information regarding participant's results without authorization from that participant.

Summary

Test results were received in 83 of 99 tests distributed (84% response rate). Of the 83 respondents:

Item 1 (Sulfur)

77 of 83 (93%) reported that Item 1 was consistent with an explosive, oxidizer, fuel or post-blast explosive residue.
5 of 83 (6%) reported that Item 1 was not consistent with an explosive, oxidizer, fuel or post-blast explosive residue.
1 of 83 (1%) did not report a response to whether Item 1 was consistent with an explosive, oxidizer, fuel or post-blast explosive residue.

83 of 83 (100%) reported Item 1 as containing Sulfur/Elemental Sulfur.
5 of 83 (6%) also reported Item 1 as containing Aluminum as well as Sulfur.
1 of 83 (1%) also reported Item 1 as containing Hexathiamine as well as Sulfur.

75 of 83 (90%) classified Item 1 as containing 'Fuel only'.
12 of 83 (14%) also classified Item 1 as containing 'No energetic material detected', as well as 'Fuel only'.
1 of 83 (1%) also classified Item 1 as containing 'Black powder' and 'Black powder substitute containing sulfur', as well as 'Fuel only'.
1 of 83 (1%) also classified Item 1 as containing 'Oxidizer only', as well as 'Fuel only'.
1 of 83 (1%) also classified Item 1 as containing 'Other', as well as 'Fuel only'.
5 of 83 (6%) classified Item 1 as containing 'Black powder', 'Black powder substitute containing sulfur' and 'Other commercial pyrotechnic mixture'.
3 of 83 (4%) classified Item 1 as containing 'Other'.

Item 2 (Potassium perchlorate)

82 of 83 (99%) reported that Item 2 was consistent with an explosive, oxidizer, fuel or post-blast explosive residue.
1 of 83 (1%) did not report a response to whether Item 2 was consistent with an explosive, oxidizer, fuel or post-blast explosive residue.

82 of 83 (99%) reported Item 2 as containing Potassium perchlorate.
1 of 83 (1%) did not report a response to the major chemical components present in Item 2.

81 of 83 (98%) classified Item 2 as containing 'Oxidizer only'.
12 of 83 (14%) also classified Item 2 as containing 'No energetic material detected', as well as 'Oxidizer only'.
4 of 83 (5%) also classified Item 2 as containing 'Flash powder' and 'Sulfur-free black powder substitute', as well as 'Oxidizer only'. 1 of these respondents also reported 'Other commercial pyrotechnic mixture'. 1 of these respondents also reported 'Non-commercial pyrotechnic mixture'.
1 of 83 (1%) also classified Item 2 as containing 'Black powder substitute containing sulfur' and 'Sulfur-free black powder substitute', as well as 'Oxidizer only'.
1 of 83 (1%) classified Item 2 as containing 'Flash powder', 'Sulfur-free black powder substitute' and 'Other commercial pyrotechnic mixture'.
1 of 83 (1%) classified Item 2 as containing 'Other'.

Item 3 (Potassium nitrate)
82 of 83 (99%) reported that Item 3 was consistent with an explosive, oxidizer, fuel or post-blast explosive residue.
1 of 83 (1%) did not report a response to whether Item 3 was consistent with an explosive, oxidizer, fuel or post-blast explosive residue.

83 of 83 (100%) reported Item 3 as containing Potassium nitrate.
1 of 83 (1%) also reported Item 3 as containing Carbohydrate as well as Potassium nitrate.

81 of 83 (98%) classified Item 3 as containing 'Oxidizer only'.
12 of 83 (14%) also classified Item 3 as containing 'No energetic material detected', as well as 'Oxidizer only'.
6 of 83 (7%) also classified Item 3 as containing 'Black powder', 'Black powder substitute containing sulfur', as well as 'Oxidizer only'. 4 of these respondents also reported 'Other commercial pyrotechnic mixture'. 1 of these respondents also reported 'Non-commercial pyrotechnic mixture'. 1 of these respondents also reported 'Sulfur-free black powder substitute'.
2 of 83 (2%) classified Item 3 as containing 'Other'.

Assigned Value

Proficiency tests under ISO 17043:2023 are assessed via comparison of the participant result to the assigned value of a proficiency test item or items. For quantitative tests, FTS determines the assigned value based on statistical methods described in ISO 13528:2022. For qualitative tests, the FTS study coordinator determines the assigned value based on a number of factors, including product source information, internal and/or external pre-distribution laboratory analysis, and consensus of responses (consensus value).

Quality systems and laboratory reporting guidelines vary greatly from laboratory to laboratory, therefore participating laboratories and their accrediting bodies are responsible for the assessment of whether a

reported result is an outlying result. For the convenience of subscribers FTS has highlighted, in yellow, any result that in the opinion of the FTS study coordinator may be inconsistent with the assigned value in the summary report.

For this proficiency test, the following assigned values are based on source information which was then confirmed by laboratory analysis:

Item 1: Sulfur (Fuel)
Item 2: Potassium perchlorate (Oxidizer)
Item 3: Potassium nitrate (Oxidizer)

Manufacturer's Information

All items were packaged in the same area at different times.

Item 1 was produced by weighing ~0.5g Sulfur (Skylighter, Inc., CH8315) using a Mettler PB1502 analytical balance. The item was packaged into a 2 mL plastic microtube (Sarstedt, Lot 0000/9105003) and labeled. The item was further heatsealed inside an AMPAC envelope.

Item 2 was produced by weighing ~0.5g Potassium perchlorate (Skylighter, Inc., CH5400) using a Mettler PB1502 analytical balance. The item was packaged into a 2 mL plastic microtube (Sarstedt, Lot 0000/9105003). The item was further heatsealed inside an AMPAC envelope.

Item 3 was produced by weighing ~0.5g Potassium nitrate (HUMCO, Lot A76059) using a Mettler PB1502 analytical balance. The item was packaged into a 2 mL plastic microtube (Sarstedt, Lot 0000/9105003). The item was further heatsealed inside an AMPAC envelope.

All items with matching UTICs were packaged into a 6" x 9" manila envelope, sealed and labeled per FTS guidelines.

Please examine the submitted items in order to identify any explosive materials present.

Items Submitted

Item 1: Sample of unknown material
Item 2: Sample of unknown material
Item 3: Sample of unknown material

3) Indicate all methods used for analysis (select all that apply):

A) ☐ Macro/Microscopic Examinations

B) ☐ Chemical Spot Tests

C) ☐ GC/FID/TEA/ECD

D) ☐ GC/MS

E) ☐ IC

F) ☐ SEM/EDS

G) ☐ Thin Layer Chromatography

H) ☐ PLM

I) ☐ HPLC

J) ☐ IR/FTIR Analysis

K) ☐ ICP-MS

L) ☐ CE

M) ☐ XRD

N) ☐ XRF

O) ☐ Ion Mobility Spectrometry (IMS)

P) ☐ DART TOF-MS

Q) ☐ UV Fluorescence

R) ☐ pH

S) ☐ Raman Spectroscopy

T) ☐ ICP-AES

U) ☐ Commercial Test Strips

V) ☐ HPLC/MS

W) ☐ Burn Test

X) ☐ Microcrystal Tests

UTIC	Webcode	Indicate all methods used for analysis (select all that apply)
p2024801	W182	SEM/EDS; IR/FTIR Analysis
p2024802	W031	Macro/Microscopic Examinations; Chemical Spot Tests; SEM/EDS; IR/FTIR Analysis
p2024803	W119	IR/FTIR Analysis; GC/MS; Macro/Microscopic Examinations; PLM; Burn Test

UTIC	Webcode	Indicate all methods used for analysis (select all that apply)
p2024804	W061	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy
p2024805	W061	SEM/EDS; IR/FTIR Analysis; Burn Test; Macro/Microscopic Examinations; GC/MS; IC
p2024807	W061	GC/MS; IR/FTIR Analysis; XRF; Raman Spectroscopy
p2024808	W061	Raman Spectroscopy; Macro/Microscopic Examinations; GC/MS; IC; SEM/EDS; IR/FTIR Analysis
p2024809	W061	SEM/EDS; IR/FTIR Analysis; Macro/Microscopic Examinations; GC/MS
p2024810	W061	GC/MS; IR/FTIR Analysis; CE
p2024811	W061	GC/MS; IR/FTIR Analysis; CE; Raman Spectroscopy
p2024812	W061	IR/FTIR Analysis; CE; GC/MS
p2024814	W108	SEM/EDS; Chemical Spot Tests; Macro/Microscopic Examinations; IR/FTIR Analysis; Microcrystal Tests
p2024815	W043	Macro/Microscopic Examinations; SEM/EDS; XRD; Raman Spectroscopy; Burn Test
p2024816	W043	Macro/Microscopic Examinations; SEM/EDS; XRD; Burn Test
p2024817	W043	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD; Burn Test
p2024818	W009	IR/FTIR Analysis; XRD; Macro/Microscopic Examinations
p2024821	W144	Macro/Microscopic Examinations; Chemical Spot Tests; SEM/EDS; IR/FTIR Analysis
p2024822	W144	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis
p2024823	W144	Chemical Spot Tests; SEM/EDS; IR/FTIR Analysis
p2024824	W193	ICP-AES; Macro/Microscopic Examinations; Chemical Spot Tests; GC/MS; IC; SEM/EDS; IR/FTIR Analysis; XRD; XRF; Burn Test
p2024825	W181	Macro/Microscopic Examinations; GC/MS; IC; SEM/EDS; HPLC; IR/FTIR Analysis; CE; Raman Spectroscopy; HPLC/MS; Burn Test
p2024826	W189	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD
p2024827	W189	Macro/Microscopic Examinations; IR/FTIR Analysis; XRD; Raman Spectroscopy
p2024828	W189	IR/FTIR Analysis; SEM/EDS; Macro/Microscopic Examinations; XRD; Burn Test
p2024829	W189	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD; Raman Spectroscopy; Burn Test
p2024830	W189	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD; Raman Spectroscopy; Burn Test
p2024834	W006	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD; Raman Spectroscopy; Burn Test
p2024835	W006	Raman Spectroscopy; Burn Test; Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD
p2024836	W170	Macro/Microscopic Examinations; Chemical Spot Tests; HPLC; XRF; Burn Test
p2024837	W170	Macro/Microscopic Examinations; Chemical Spot Tests; HPLC; IR/FTIR Analysis; XRF; Burn Test
p2024838	W170	Macro/Microscopic Examinations; Chemical Spot Tests; HPLC; IR/FTIR Analysis; XRF; Burn Test

UTIC	Webcode	Indicate all methods used for analysis (select all that apply)
p2024839	W170	Macro/Microscopic Examinations; Chemical Spot Tests; HPLC; IR/FTIR Analysis; XRF; Burn Test
p2024840	W170	Macro/Microscopic Examinations; Chemical Spot Tests; HPLC; IR/FTIR Analysis; XRF; Burn Test
p2024841	W262	XRD; XRF; IR/FTIR Analysis; GC/MS; Macro/Microscopic Examinations
p2024842	W262	IR/FTIR Analysis; XRD; Macro/Microscopic Examinations; GC/MS; XRF
p2024843	W262	XRF; Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD
p2024844	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF
p2024845	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF
p2024846	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF; Raman Spectroscopy
p2024847	W262	XRF; Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD
p2024848	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF
p2024849	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF
p2024850	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF
p2024851	W262	GC/MS; IR/FTIR Analysis; XRD; XRF
p2024852	W262	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; XRF
p2024853	W128	Macro/Microscopic Examinations; IC; XRD; XRF; HPLC/MS; Burn Test
p2024854	W132	Macro/Microscopic Examinations; GC/MS; IC; IR/FTIR Analysis; XRF
p2024855	W160	Macro/Microscopic Examinations; GC/FID/TEA/ECD; IC; SEM/EDS; IR/FTIR Analysis; Burn Test
p2024856	W153	Macro/Microscopic Examinations; GC/FID/TEA/ECD; GC/MS; IC; IR/FTIR Analysis; XRF; pH; Commercial Test Strips; Burn Test
p2024857	W092	Macro/Microscopic Examinations; Chemical Spot Tests; GC/MS; SEM/EDS; CE; Raman Spectroscopy
p2024859	W002	Macro/Microscopic Examinations; PLM; IR/FTIR Analysis; XRF; Burn Test; Microcrystal Tests
p2024860	W002	Macro/Microscopic Examinations; Chemical Spot Tests; PLM; IR/FTIR Analysis; XRF; Microcrystal Tests
p2024862	W224	GC/MS; IC; IR/FTIR Analysis; Raman Spectroscopy; HPLC/MS
p2024863	W093	XRF; IR/FTIR Analysis; GC/MS; Burn Test
p2024866	W135	XRF; Chemical Spot Tests; GC/MS; IR/FTIR Analysis; Microcrystal Tests
p2024867	W120	GC/MS; pH; Burn Test; Macro/Microscopic Examinations; PLM; Chemical Spot Tests
p2024868	W012	Macro/Microscopic Examinations; Chemical Spot Tests; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy; Burn Test
p2024869	W105	Macro/Microscopic Examinations; SEM/EDS; PLM; IR/FTIR Analysis; XRD; Burn Test
p2024870	W027	Macro/Microscopic Examinations; IC; SEM/EDS; PLM; IR/FTIR Analysis; Microcrystal Tests
p2024871	W027	Macro/Microscopic Examinations; GC/MS; PLM; IR/FTIR Analysis; Microcrystal Tests

UTIC	Webcode	Indicate all methods used for analysis (select all that apply)
p2024873	W001	Chemical Spot Tests; SEM/EDS; PLM; IR/FTIR Analysis; Raman Spectroscopy; Macro/Microscopic Examinations
p2024874	W096	Macro/Microscopic Examinations; Chemical Spot Tests; SEM/EDS; PLM; IR/FTIR Analysis; Raman Spectroscopy; Burn Test; Microcrystal Tests
p2024875	W123	Macro/Microscopic Examinations; Chemical Spot Tests; GC/MS; PLM; IR/FTIR Analysis; XRF; Microcrystal Tests
p2024876	W209	XRF; Commercial Test Strips; Macro/Microscopic Examinations; Chemical Spot Tests; GC/MS; HPLC; IR/FTIR Analysis
p2024877	W053	Macro/Microscopic Examinations; XRD; XRF; Raman Spectroscopy
p2024878	W130	Macro/Microscopic Examinations; IR/FTIR Analysis; XRD; XRF; Raman Spectroscopy
p2024879	W130	GC/MS; IR/FTIR Analysis; XRF; Raman Spectroscopy; Macro/Microscopic Examinations
p2024880	W150	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy
p2024881	W025	Macro/Microscopic Examinations; Chemical Spot Tests; SEM/EDS; IR/FTIR Analysis; Burn Test; Microcrystal Tests
p2024882	W017	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy; Burn Test
p2024883	W013	Macro/Microscopic Examinations; Chemical Spot Tests; IR/FTIR Analysis; XRF; Commercial Test Strips; Burn Test; Microcrystal Tests; PLM
p2024884	W085	Macro/Microscopic Examinations; Chemical Spot Tests; SEM/EDS; PLM; IR/FTIR Analysis; Burn Test
p2024885	W051	Macro/Microscopic Examinations; GC/MS; IC; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy
p2024886	W016	SEM/EDS; Chemical Spot Tests; Macro/Microscopic Examinations; PLM; Microcrystal Tests
p2024887	W175	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD; Burn Test
p2024889	W162	IR/FTIR Analysis; SEM/EDS; Macro/Microscopic Examinations; Commercial Test Strips
p2024890	W055	Macro/Microscopic Examinations; PLM; XRD; XRF; Microcrystal Tests
p2024891	W055	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRD; Burn Test
p2024893	W047	Macro/Microscopic Examinations; SEM/EDS; PLM; XRD; Raman Spectroscopy
p2024895	W007	Macro/Microscopic Examinations; IR/FTIR Analysis; XRF; Microcrystal Tests
p2024896	W007	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; CE; Microcrystal Tests
p2024897	W007	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRF; Microcrystal Tests
p2024898	W007	Macro/Microscopic Examinations; GC/MS; PLM; IR/FTIR Analysis; XRF; Microcrystal Tests

4) Other methods used (if none, please enter "N/A"):

UTIC	Webcode	Other methods used
p2024862	W224	Elemental analysis of carbon and sulfur
p2024868	W012	Balance
p2024875	W123	Solubility tests

5) Is Item 1 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?

A) ☐ Yes

B) ☐ No

6) Item 1

Describe the major chemical component(s) present in item 1 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)

UTIC	Webcode	Is Item 1 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in item 1 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024801	W182	Yes	Sulfur
p2024802	W031	Yes	sulfur
p2024803	W119	Yes	Sulfur
p2024804	W061	Yes	Elemental Sulphur
p2024805	W061	Yes	Sulfur.
p2024807	W061	Yes	Sulfur
p2024808	W061	Yes	Item 1 was a homogeneous yellow powder. Item 1 was identified as sulfur.
p2024809	W061	Yes	Elemental Sulfur
p2024810	W061	Yes	Sulphur
p2024811	W061	Yes	Sulphur
p2024812	W061	Yes	Sulphur
p2024814	W108	Yes	Sulfur
p2024815	W043	Yes	Sulfur
p2024816	W043	Yes	sulfur
p2024817	W043	Yes	Sulfur
p2024818	W009	Yes	Sulfur.

UTIC	Webcode	Is Item 1 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in item 1 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024821	W144	Yes	Sulfur
p2024822	W144	Yes	Elemental sulfur
p2024823	W144	Yes	Sulfur
p2024824	W193	Yes	Sulfur
p2024825	W181	Yes	Sulfur
p2024826	W189	Yes	Sulfur
p2024827	W189	Yes	Sulfur
p2024828	W189	Yes	Sulfur
p2024829	W189	Yes	Sulfur
p2024830	W189	Yes	Sulfur
p2024834	W006	Yes	Sulfur
p2024835	W006	Yes	Sulfur
p2024836	W170	No	Sulfur (S) and Aluminum (Al)
p2024837	W170	No	sulfur (S) and aluminum (Al).
p2024838	W170	No	Sulfur (S) and aluminum (Al).
p2024839	W170	No	Sulfur (S) and aluminum (Al)
p2024840	W170	No	Sulfur (S) and aluminum (Al)
p2024841	W262	Yes	Sulfur
p2024842	W262	Yes	Sulfur
p2024843	W262	Yes	Sulfur
p2024844	W262	Yes	Sulfur was identified in Exhibit 1.
p2024845	W262	Yes	Sulfur
p2024846	W262	Yes	Sulfur
p2024847	W262	Yes	Sulfur
p2024848	W262	Yes	Sulfur
p2024849	W262	Yes	Sulfur
p2024850	W262	Yes	Sulfur
p2024851	W262	Yes	Sulfur
p2024852	W262	Yes	Sulfur
p2024853	W128	Yes	Sulfur
p2024854	W132	Yes	Sulfur
p2024855	W160	Yes	Sulphur
p2024856	W153	Yes	Sulfur
p2024857	W092	Yes	Item #1 was found to contain sulfur.
p2024859	W002	Yes	sulfur
p2024860	W002	Yes	Sulfur
p2024862	W224	Yes	Sulfur
p2024863	W093	Yes	Sulfur
p2024866	W135	Yes	Sulfur was identified.

UTIC	Webcode	Is Item 1 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in item 1 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024867	W120	(blank)	The instruments used to detect the compound were out of service at the time of the examination. Octa-atomic Sulfur and hexathiamine were detected using GC/MS, however this was not confirmed because the FTIR and SEM-EDS were out of service.
p2024868	W012	Yes	Sulfur
p2024869	W105	Yes	Sulfur (pure)
p2024870	W027	Yes	Sulfur
p2024871	W027	Yes	Sulfur
p2024873	W001	Yes	Sulfur
p2024874	W096	Yes	sulfur
p2024875	W123	Yes	Sulfur
p2024876	W209	Yes	Sulphur
p2024877	W053	Yes	The following major component is identified: • Sulphur Sulphur can be applied both as fuel and as oxidizer in pyrotechnic mixtures. As a fuel, is by far the most common, but from own research we know that a powder mixture of Sulphur and Magnesium will explode, with Sulphur acting as the oxidizer.
p2024878	W130	Yes	Sulfur
p2024879	W130	Yes	Item #1: Sulfur was identified.
p2024880	W150	Yes	Sulfur
p2024881	W025	Yes	sulfur
p2024882	W017	Yes	Sulfur powder
p2024883	W013	Yes	sulfur
p2024884	W085	Yes	Sulfur
p2024885	W051	Yes	Sulfur
p2024886	W016	Yes	Sulfur
p2024887	W175	Yes	sulfur
p2024889	W162	Yes	Sulfur
p2024890	W055	Yes	Sulfur
p2024891	W055	Yes	Sulfur (S)
p2024893	W047	Yes	Sulfur
p2024895	W007	Yes	Sulfur
p2024896	W007	Yes	Sulfur
p2024897	W007	Yes	Sulfur
p2024898	W007	Yes	Sulfur

7) What type of energetic material is consistent with the chemical components found in Item 1 (check all that apply):

A) ☐ No energetic material detected

B) ☐ Black powder

C) ☐ Black powder substitute containing sulfur

D) ☐ Sulfur-free black powder substitute

E) ☐ Single-base smokeless powder

F) ☐ Double-base smokeless powder

G) ☐ Triple-base smokeless powder

H) ☐ Other commercial pyrotechnic mixture

I) ☐ Flash powder

J) ☐ Non-commercial pyrotechnic mixture

K) ☐ Oxidizer only

L) ☐ Fuel only

M) ☐ Chemical overpressure device

N) ☐ Other

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 1 (check all that apply)
p2024801	W182	Fuel only
p2024802	W031	Fuel only
p2024803	W119	Other
p2024804	W061	No energetic material detected; Fuel only
p2024805	W061	Fuel only
p2024807	W061	No energetic material detected; Fuel only
p2024808	W061	Fuel only
p2024809	W061	Fuel only
p2024810	W061	Fuel only
p2024811	W061	Fuel only
p2024812	W061	Fuel only

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 1 (check all that apply)
p2024814	W108	Fuel only
p2024815	W043	Fuel only
p2024816	W043	Fuel only
p2024817	W043	Fuel only
p2024818	W009	Fuel only
p2024821	W144	Fuel only
p2024822	W144	Fuel only
p2024823	W144	Fuel only
p2024824	W193	Fuel only
p2024825	W181	Fuel only
p2024826	W189	Fuel only; No energetic material detected
p2024827	W189	Fuel only; No energetic material detected
p2024828	W189	Fuel only; No energetic material detected
p2024829	W189	No energetic material detected; Fuel only
p2024830	W189	No energetic material detected; Fuel only
p2024834	W006	Fuel only; No energetic material detected
p2024835	W006	No energetic material detected; Fuel only
p2024836	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture
p2024837	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture
p2024838	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture
p2024839	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture
p2024840	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture
p2024841	W262	Fuel only
p2024842	W262	Fuel only
p2024843	W262	Fuel only
p2024844	W262	Fuel only
p2024845	W262	Fuel only
p2024846	W262	Fuel only
p2024847	W262	Fuel only
p2024848	W262	Fuel only
p2024849	W262	Fuel only
p2024850	W262	Fuel only
p2024851	W262	Fuel only
p2024852	W262	Black powder; Black powder substitute containing sulfur; Fuel only
p2024853	W128	Fuel only
p2024854	W132	Fuel only

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 1 (check all that apply)
p2024855	W160	No energetic material detected; Fuel only
p2024856	W153	Fuel only
p2024857	W092	Fuel only
p2024859	W002	Fuel only
p2024860	W002	Fuel only
p2024862	W224	Fuel only
p2024863	W093	Fuel only
p2024866	W135	Fuel only; Other
p2024867	W120	Other
p2024868	W012	Fuel only
p2024869	W105	Fuel only
p2024870	W027	Fuel only
p2024871	W027	Fuel only
p2024873	W001	Fuel only
p2024874	W096	Fuel only
p2024875	W123	Fuel only
p2024876	W209	Fuel only
p2024877	W053	Oxidizer only; Fuel only
p2024878	W130	Fuel only
p2024879	W130	Fuel only
p2024880	W150	Other
p2024881	W025	Fuel only
p2024882	W017	Fuel only
p2024883	W013	Fuel only; No energetic material detected
p2024884	W085	Fuel only
p2024885	W051	Fuel only
p2024886	W016	Fuel only
p2024887	W175	Fuel only
p2024889	W162	Fuel only
p2024890	W055	Fuel only
p2024891	W055	No energetic material detected; Fuel only
p2024893	W047	Fuel only
p2024895	W007	Fuel only
p2024896	W007	Fuel only
p2024897	W007	Fuel only
p2024898	W007	Fuel only

8) Is Item 2 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?

A) ☐ Yes

B) ☐ No

9) Item 2

Describe the major chemical component(s) present in Item 2 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)

UTIC	Webcode	Is Item 2 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in Item 2 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024801	W182	Yes	potassium perchlorate
p2024802	W031	Yes	potassium perchlorate
p2024803	W119	Yes	Potassium perchlorate
p2024804	W061	Yes	Potassium perchlorate
p2024805	W061	Yes	Potassium perchlorate.
p2024807	W061	Yes	Potassium perchlorate
p2024808	W061	Yes	Item 2 was a white coloured clumped material, which could be easily broken up to form a white crystalline powder. Item 2 was identified as potassium perchlorate.
p2024809	W061	Yes	potassium perchlorate
p2024810	W061	Yes	potassium perchlorate
p2024811	W061	Yes	Potassium perchlorate
p2024812	W061	Yes	Potassium perchlorate ($KClO_4$)
p2024814	W108	Yes	Potassium Perchlorate
p2024815	W043	Yes	Potassium Perchlorate
p2024816	W043	Yes	potassium perchlorate
p2024817	W043	Yes	Potassium perchlorate
p2024818	W009	Yes	Potassium Perchlorate.
p2024821	W144	Yes	potassium perchlorate
p2024822	W144	Yes	Potassium perchlorate
p2024823	W144	Yes	Potassium perchlorate
p2024824	W193	Yes	Potassium perchlorate
p2024825	W181	Yes	Potassium perchlorate
p2024826	W189	Yes	Potassium perchlorate
p2024827	W189	Yes	Potassium perchlorate
p2024828	W189	Yes	Potassium perchlorate
p2024829	W189	Yes	potassium perchlorate
p2024830	W189	Yes	Potassium perchlorate

UTIC	Webcode	Is Item 2 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in Item 2 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024834	W006	Yes	Potassium perchlorate
p2024835	W006	Yes	Potassium perchlorate
p2024836	W170	Yes	Potassium perchlorate ($KClO_4$).
p2024837	W170	Yes	Potassium perchlorate ($KClO_4$).
p2024838	W170	Yes	Potassium perchlorate ($KClO_4$).
p2024839	W170	Yes	Potassium perchlorate ($KClO_4$).
p2024840	W170	Yes	Potassium perchlorate ($KClO_4$).
p2024841	W262	Yes	Potassium perchlorate
p2024842	W262	Yes	Potassium perchlorate
p2024843	W262	Yes	Potassium Perchlorate
p2024844	W262	Yes	Potassium perchlorate (KClO4) was identified in Exhibit 2.
p2024845	W262	Yes	Potassium perchlorate
p2024846	W262	Yes	Potassium Perchlorate
p2024847	W262	Yes	Potassium perchlorate
p2024848	W262	Yes	Potassium perchlorate
p2024849	W262	Yes	Potassium Perchlorate
p2024850	W262	Yes	Potassium Perchlorate
p2024851	W262	Yes	Potassium perchlorate
p2024852	W262	Yes	Potassium perchlorate
p2024853	W128	Yes	Potassium perchlorate
p2024854	W132	Yes	Potassium Perchlorate
p2024855	W160	Yes	Potassium Perchlorate
p2024856	W153	Yes	Potassium perchlorate
p2024857	W092	Yes	Item #2 was found to contain potassium perchlorate.
p2024859	W002	Yes	potassium perchlorate
p2024860	W002	Yes	potassium perchlorate
p2024862	W224	Yes	Potassium perchlorate
p2024863	W093	Yes	Potassium perchlorate
p2024866	W135	Yes	Potassium perchlorate was identified.
p2024867	W120	(blank)	The instruments used to detect the compound were out of service at the time of the examination.
p2024868	W012	Yes	Potassium perchlorate
p2024869	W105	Yes	Potassium percholate
p2024870	W027	Yes	Potassium perchlorate
p2024871	W027	Yes	Potassium perchlorate
p2024873	W001	Yes	potassium perchlorate

UTIC	Webcode	Is Item 2 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in Item 2 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024874	W096	Yes	potassium perchlorate
p2024875	W123	Yes	Potassium perchlorate
p2024876	W209	Yes	Potassium Perchlorate
p2024877	W053	Yes	The following major component is identified: • Potassium perchlorate Potassium perchlorate is widely used as oxidizer in pyrotechnic mixtures.
p2024878	W130	Yes	Potassium perchlorate
p2024879	W130	Yes	Item #2: Potassium perchlorate was identified.
p2024880	W150	Yes	potassium perchlorate
p2024881	W025	Yes	potassium perchlorate
p2024882	W017	Yes	Potassium perchlorate
p2024883	W013	Yes	potassium perchlorate
p2024884	W085	Yes	Potassium perchlorate
p2024885	W051	Yes	Potassium perchlorate
p2024886	W016	Yes	Potassium Perchlorate
p2024887	W175	Yes	potassium perchlorate
p2024889	W162	Yes	Potasium perchlorate
p2024890	W055	Yes	Potassium perchlorate (KClO4)
p2024891	W055	Yes	Potassium perchlorate (KClO4)
p2024893	W047	Yes	Potassium Perchlorate
p2024895	W007	Yes	Potassium Perchlorate
p2024896	W007	Yes	potassium perchlorate
p2024897	W007	Yes	Potassium perchlorate
p2024898	W007	Yes	Potassium Perchlorate

10) What type of energetic material is consistent with the chemical components found in Item 2 (check all that apply):

A) ☐ No energetic material detected

B) ☐ Black powder

C) ☐ Black powder substitute containing sulfur

D) ☐ Sulfur-free black powder substitute

E) ☐ Single-base smokeless powder

F) ☐ Double-base smokeless powder

G) ☐ Triple-base smokeless powder

H) ☐ Other commercial pyrotechnic mixture

I) ☐ Flash powder

J) ☐ Non-commercial pyrotechnic mixture

K) ☐ Oxidizer only

L) ☐ Fuel only

M) ☐ Chemical overpressure device

N) ☐ Other

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 2 (check all that apply)
p2024801	W182	Oxidizer only
p2024802	W031	Oxidizer only
p2024803	W119	Oxidizer only
p2024804	W061	No energetic material detected; Oxidizer only
p2024805	W061	Oxidizer only
p2024807	W061	No energetic material detected; Oxidizer only
p2024808	W061	Oxidizer only
p2024809	W061	Oxidizer only
p2024810	W061	Oxidizer only
p2024811	W061	Oxidizer only
p2024812	W061	Oxidizer only
p2024814	W108	Oxidizer only
p2024815	W043	Oxidizer only
p2024816	W043	Oxidizer only
p2024817	W043	Oxidizer only
p2024818	W009	Oxidizer only
p2024821	W144	Oxidizer only
p2024822	W144	Oxidizer only
p2024823	W144	Oxidizer only
p2024824	W193	Oxidizer only
p2024825	W181	Oxidizer only
p2024826	W189	Oxidizer only; No energetic material detected
p2024827	W189	Oxidizer only; No energetic material detected
p2024828	W189	Oxidizer only; No energetic material detected

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 2 (check all that apply)
p2024829	W189	No energetic material detected; Oxidizer only
p2024830	W189	No energetic material detected; Oxidizer only
p2024834	W006	Oxidizer only; No energetic material detected
p2024835	W006	No energetic material detected; Oxidizer only
p2024836	W170	Other commercial pyrotechnic mixture; Flash powder; Oxidizer only; Sulfur-free black powder substitute
p2024837	W170	Sulfur-free black powder substitute; Other commercial pyrotechnic mixture; Flash powder
p2024838	W170	Sulfur-free black powder substitute; Flash powder; Non-commercial pyrotechnic mixture; Oxidizer only
p2024839	W170	Sulfur-free black powder substitute; Other commercial pyrotechnic mixture; Flash powder; Oxidizer only
p2024840	W170	Sulfur-free black powder substitute; Other commercial pyrotechnic mixture; Flash powder; Oxidizer only
p2024841	W262	Oxidizer only
p2024842	W262	Oxidizer only
p2024843	W262	Oxidizer only
p2024844	W262	Oxidizer only
p2024845	W262	Oxidizer only
p2024846	W262	Oxidizer only
p2024847	W262	Oxidizer only
p2024848	W262	Oxidizer only
p2024849	W262	Oxidizer only
p2024850	W262	Oxidizer only
p2024851	W262	Oxidizer only
p2024852	W262	Black powder substitute containing sulfur; Sulfur-free black powder substitute; Oxidizer only
p2024853	W128	Oxidizer only
p2024854	W132	Oxidizer only
p2024855	W160	No energetic material detected; Oxidizer only
p2024856	W153	Oxidizer only
p2024857	W092	Oxidizer only
p2024859	W002	Oxidizer only
p2024860	W002	Oxidizer only
p2024862	W224	Oxidizer only
p2024863	W093	Oxidizer only
p2024866	W135	Oxidizer only
p2024867	W120	Other
p2024868	W012	Oxidizer only
p2024869	W105	Oxidizer only
p2024870	W027	Oxidizer only

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 2 (check all that apply)
p2024871	W027	Oxidizer only
p2024873	W001	Oxidizer only
p2024874	W096	Oxidizer only
p2024875	W123	Oxidizer only
p2024876	W209	Oxidizer only
p2024877	W053	Oxidizer only
p2024878	W130	Oxidizer only
p2024879	W130	Oxidizer only
p2024880	W150	Oxidizer only
p2024881	W025	Oxidizer only
p2024882	W017	Oxidizer only
p2024883	W013	Oxidizer only; No energetic material detected
p2024884	W085	Oxidizer only
p2024885	W051	Oxidizer only
p2024886	W016	Oxidizer only
p2024887	W175	Oxidizer only
p2024889	W162	Oxidizer only
p2024890	W055	Oxidizer only
p2024891	W055	No energetic material detected; Oxidizer only
p2024893	W047	Oxidizer only
p2024895	W007	Oxidizer only
p2024896	W007	Oxidizer only
p2024897	W007	Oxidizer only
p2024898	W007	Oxidizer only

11) Is Item 3 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?

A) ☐ Yes

B) ☐ No

12) Item 3

Describe the major chemical component(s) present in Item 3 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)

UTIC	Webcode	Is Item 3 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in Item 3 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024801	W182	Yes	potassium nitrate
p2024802	W031	Yes	potassium nitrate
p2024803	W119	Yes	Potassium nitrate
p2024804	W061	Yes	Potassium Nitrate
p2024805	W061	Yes	Potassium nitrate.
p2024807	W061	Yes	Potassium nitrate
p2024808	W061	Yes	Item 3 was a white crystalline material consisting of different sized crystals. Larger crystals could be broken down into a material similar to the smaller crystals. Item 3 was identifed as potassium nitrate.
p2024809	W061	Yes	potassium nitrate
p2024810	W061	Yes	potassium nitrate
p2024811	W061	Yes	Potassium nitrate
p2024812	W061	Yes	Potassium nitrate (KNO_3)
p2024814	W108	Yes	Potassium Nitrate
p2024815	W043	Yes	Potassium Nitrate
p2024816	W043	Yes	potassium nitrate
p2024817	W043	Yes	Potassium nitrate
p2024818	W009	Yes	Potassium Nitrate.
p2024821	W144	Yes	potassium nitrate
p2024822	W144	Yes	Potassium nitrate
p2024823	W144	Yes	Potassium nitrate
p2024824	W193	Yes	Potassium Nitrate
p2024825	W181	Yes	Potassium nitrate Carbohydrate
p2024826	W189	Yes	Potassium nitrate
p2024827	W189	Yes	Potassium nitrate
p2024828	W189	Yes	Potassium nitrate
p2024829	W189	Yes	Potassium nitrate
p2024830	W189	Yes	Potassium nitrate
p2024834	W006	Yes	Potassium nitrate
p2024835	W006	Yes	Potassium Nitrate
p2024836	W170	Yes	Potassium nitrate (KNO_3)
p2024837	W170	Yes	Potassium nitrate (KNO_3).
p2024838	W170	Yes	Potassium nitrate (KNO_3).
p2024839	W170	Yes	Potassium nitrate (KNO_3).
p2024840	W170	Yes	Potassium nitrate (KNO_3).
p2024841	W262	Yes	potassium nitrate

UTIC	Webcode	Is Item 3 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in Item 3 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024842	W262	Yes	Potassium nitrate
p2024843	W262	Yes	Potassium Nitrate
p2024844	W262	Yes	Potassium nitrate (KNO3) was identified in Exhibit 3.
p2024845	W262	Yes	Potassium nitrate
p2024846	W262	Yes	Potassium Nitrate
p2024847	W262	Yes	Potassium nitrate
p2024848	W262	Yes	Potassium nitrate
p2024849	W262	Yes	Potassium Nitrate
p2024850	W262	Yes	Potassium Nitrate
p2024851	W262	Yes	Potassium nitrate
p2024852	W262	Yes	Potassium nitrate
p2024853	W128	Yes	Potassium nitrate
p2024854	W132	Yes	Potassium Nitrate
p2024855	W160	Yes	Potassium Nitrate
p2024856	W153	Yes	Potassium nitrate
p2024857	W092	Yes	Item #3 was found to contain potassium nitrate.
p2024859	W002	Yes	potassium nitrate
p2024860	W002	Yes	potassium nitrate
p2024862	W224	Yes	Potassium nitrate
p2024863	W093	Yes	Potassium nitrate
p2024866	W135	Yes	Potassium nitrate was identified.
p2024867	W120	(blank)	The instruments used to detect the compound were out of service at the time of the examination. A presumptive test for nitrates was positive using DPA reagent. Similarities were observed when the sample and potassium nitrate were recrystalized.
p2024868	W012	Yes	Potassium nitrate
p2024869	W105	Yes	Potassium nitrate
p2024870	W027	Yes	Potassium nitrate
p2024871	W027	Yes	Potassium nitrate
p2024873	W001	Yes	potassium nitrate
p2024874	W096	Yes	potassium nitrate
p2024875	W123	Yes	Potassium nitrate
p2024876	W209	Yes	Potassium Nitrate

UTIC	Webcode	Is Item 3 consistent with an explosive, oxidizer, fuel or post-blast explosive residue?	Describe the major chemical component(s) present in Item 3 (Example: Nitrocellulose, Nitroglycerine, Diphenylamine, Ethyl Centralite)
p2024877	W053	Yes	The following major component is identified: • Potassium nitrate Potassium nitrate is widely used as oxidizer in pyrotechnic mixtures.
p2024878	W130	Yes	Potassium nitrate
p2024879	W130	Yes	Item #3: Potassium nitrate was identified.
p2024880	W150	Yes	potassium nitrate
p2024881	W025	Yes	potassium nitrate
p2024882	W017	Yes	Potassium nitrate
p2024883	W013	Yes	potassium nitrate
p2024884	W085	Yes	Potassium nitrate
p2024885	W051	Yes	Potassium nitrate
p2024886	W016	Yes	Potassium Nitrate
p2024887	W175	Yes	potassium nitrate
p2024889	W162	Yes	Potasium nitrate
p2024890	W055	Yes	Potassium Nitrate (KNO3)
p2024891	W055	Yes	Potassium nitrate (KNO3)
p2024893	W047	Yes	Potassium Nitrate
p2024895	W007	Yes	Potassium Nitrate
p2024896	W007	Yes	potassium nitrate
p2024897	W007	Yes	Potassium nitrate
p2024898	W007	Yes	Potassium Nitrate

13) What type of energetic material is consistent with the chemical components found in Item 3 (check all that apply):

A) ☐ No energetic material detected

B) ☐ Black powder

C) ☐ Black powder substitute containing sulfur

D) ☐ Sulfur-free black powder substitute

E) ☐ Single-base smokeless powder

F) ☐ Double-base smokeless powder

G) ☐ Triple-base smokeless powder

H) ☐ Other commercial pyrotechnic mixture

I) ☐ Flash powder

J) ☐ Non-commercial pyrotechnic mixture

K) ☐ Oxidizer only

L) ☐ Fuel only

M) ☐ Chemical overpressure device

N) ☐ Other

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 3 (check all that apply)
p2024801	W182	Oxidizer only
p2024802	W031	Oxidizer only
p2024803	W119	Oxidizer only
p2024804	W061	No energetic material detected; Oxidizer only
p2024805	W061	Oxidizer only
p2024807	W061	No energetic material detected; Oxidizer only
p2024808	W061	Oxidizer only
p2024809	W061	Oxidizer only
p2024810	W061	Oxidizer only
p2024811	W061	Oxidizer only
p2024812	W061	Oxidizer only
p2024814	W108	Oxidizer only
p2024815	W043	Oxidizer only
p2024816	W043	Oxidizer only
p2024817	W043	Oxidizer only
p2024818	W009	Oxidizer only
p2024821	W144	Oxidizer only
p2024822	W144	Oxidizer only
p2024823	W144	Oxidizer only
p2024824	W193	Oxidizer only
p2024825	W181	Other
p2024826	W189	Oxidizer only; No energetic material detected
p2024827	W189	Oxidizer only; No energetic material detected
p2024828	W189	Oxidizer only; No energetic material detected
p2024829	W189	No energetic material detected; Oxidizer only
p2024830	W189	No energetic material detected; Oxidizer only
p2024834	W006	Oxidizer only; No energetic material detected
p2024835	W006	No energetic material detected; Oxidizer only

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 3 (check all that apply)
p2024836	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture; Non-commercial pyrotechnic mixture; Oxidizer only
p2024837	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture; Non-commercial pyrotechnic mixture; Oxidizer only
p2024838	W170	Black powder; Black powder substitute containing sulfur; Non-commercial pyrotechnic mixture; Oxidizer only
p2024839	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture; Non-commercial pyrotechnic mixture; Oxidizer only
p2024840	W170	Black powder; Black powder substitute containing sulfur; Other commercial pyrotechnic mixture; Non-commercial pyrotechnic mixture; Oxidizer only
p2024841	W262	Oxidizer only
p2024842	W262	Oxidizer only
p2024843	W262	Oxidizer only
p2024844	W262	Oxidizer only
p2024845	W262	Oxidizer only
p2024846	W262	Oxidizer only
p2024847	W262	Oxidizer only
p2024848	W262	Oxidizer only
p2024849	W262	Oxidizer only
p2024850	W262	Oxidizer only
p2024851	W262	Oxidizer only
p2024852	W262	Black powder; Black powder substitute containing sulfur; Sulfur-free black powder substitute; Oxidizer only
p2024853	W128	Oxidizer only
p2024854	W132	Oxidizer only
p2024855	W160	No energetic material detected; Oxidizer only
p2024856	W153	Oxidizer only
p2024857	W092	Oxidizer only
p2024859	W002	Oxidizer only
p2024860	W002	Oxidizer only
p2024862	W224	Oxidizer only
p2024863	W093	Oxidizer only
p2024866	W135	Oxidizer only
p2024867	W120	Other
p2024868	W012	Oxidizer only
p2024869	W105	Oxidizer only
p2024870	W027	Oxidizer only
p2024871	W027	Oxidizer only
p2024873	W001	Oxidizer only
p2024874	W096	Oxidizer only
p2024875	W123	Oxidizer only

UTIC	Webcode	What type of energetic material is consistent with the chemical components found in Item 3 (check all that apply)
p2024876	W209	Oxidizer only
p2024877	W053	Oxidizer only
p2024878	W130	Oxidizer only
p2024879	W130	Oxidizer only
p2024880	W150	Oxidizer only
p2024881	W025	Oxidizer only
p2024882	W017	Oxidizer only
p2024883	W013	Oxidizer only; No energetic material detected
p2024884	W085	Oxidizer only
p2024885	W051	Oxidizer only
p2024886	W016	Oxidizer only
p2024887	W175	Oxidizer only
p2024889	W162	Oxidizer only
p2024890	W055	Oxidizer only
p2024891	W055	No energetic material detected; Oxidizer only
p2024893	W047	Oxidizer only
p2024895	W007	Oxidizer only
p2024896	W007	Oxidizer only
p2024897	W007	Oxidizer only
p2024898	W007	Oxidizer only

14) How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024801	W182	Item #1: sulfur Item #2: potassium perchlorate Item #3: potassium nitrate Potassium perchlorate and potassium nitrate can be utilized as oxidizers in explosive devices. Sulfur is a fuel that can be used in explosive devices.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024802	W031	ITEMS: 1 a sealed manila envelope identified as "FTS FORENSIC TESTING SERVICES FTS-24-EXP p2024802" containing: 1-1 a light-yellow powder in a closed plastic vial identified as "FTS-24-EXP Item 1 p2024802" 1-2 a white powder in a closed plastic vial identified as "FTS-24-EXP Item 2 p2024802" 1-3 a white powder in a closed plastic vial identified as "FTS-24-EXP Item 3 p2024802" RESULTS: Items #1-1, #1-2, and #1-3 were examined using stereomicroscopy, Fourier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy Energy Dispersive X-Ray Spectrometry (SEM/EDS). The light-yellow powder in item #1-1 was identified as sulfur. Sulfur can be used as a fuel in some low explosive mixtures. Potassium perchlorate, an oxidizer, was identified in item #1-2. Potassium nitrate, an oxidizer, was identified in item #1-3.
p2024803	W119	Item 1A was analyzed visually, microscopically, by flame test, and instrumentally by Fourier Transform Infrared Spectroscopy (FTIR) and Gas Chromatography Mass Spectrometry. Item 1A is consistent with sulfur which can be used a fuel or a tinder in some low explosive mixtures. Item 1B was analyzed visually, microscopically, by flame test, and instrumentally by Fourier Transform Infrared Spectroscopy (FTIR). Item 1B is consistent with potassium perchlorate which can be used as an oxidizer in some low explosive mixtures. Item 1C was analyzed visually, microscopically, by flame test, and instrumentally by Fourier Transform Infrared Spectroscopy (FTIR). Item 1C is consistent with potassium nitrate which can be used as an oxidizer in some low explosive mixtures.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024804	W061	The light-yellow crystalline solid in Item 1 was identified as elemental sulphur. Elemental sulphur is not an explosive substance. It is a fuel which can be mixed with an appropriate oxidiser to form an explosive mixture. The white crystalline solid in Item 2 was identified as potassium perchlorate. Potassium perchlorate is not an explosive substance. It is a strong oxidising agent which can be mixed with an appropriate fuel to form an explosive mixture. The white crystalline solid in Item 3 was identified as potassium nitrate. Potassium nitrate is not an explosive substance. It is a strong oxidising agent which can be mixed with an appropriate fuel to form an explosive mixture. No energetic material was identified on all the items submitted for examination.
p2024805	W061	Item 1 The item comprised a plastic vial containing yellow powder. The total weight of the powder was 0.48 grams. The powder did not burn vigorously when ignited and was identified as sulfur. Sulfur can be used as a fuel in explosive mixtures. Item 2 The item comprised a plastic vial containing white crystalline powder. The total weight of the powder was 0.48 grams. The powder did not burn vigorously when ignited and was identified as potassium perchlorate. Potassium perchlorate can be used as an oxidiser in explosive mixtures. Item 3 The item comprised a plastic vial containing white crystalline powder. The total weight of the powder was 0.51 grams. The powder did not burn vigorously when ignited and was identified as potassium nitrate. Potassium nitrate can be used as an oxidiser in explosive mixtures.
p2024807	W061	Results of analysis were as follows: 1. Item 1 contained Sulfur. 2. Item 2 contained Potassium perchlorate. 3. Item 3 contained Potassium nitrate. Information available in this laboratory indicates that Sulfur, Potassium nitrate and Potassium perchlorate may be used as ingredients in a variety of pyrotechnic and low explosive mixtures.
p2024808	W061	Item 1 was a yellow powder which was identified as sulfur. Item 2 was a white crystalline powder which was identified as potassium perchlorate. Potassium perchlorate is a strong oxidising agent. Item 3 consisted of white crystals and was identified as potassium nitrate. Potassium nitrate is a strong oxidising agent.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024809	W061	Item 1 - Small plastic vial containing a small quantity of a yellow solid. This solid was identified as elemental sulfur. Item 2 - Small plastic vial containing a small quantity of a white solid. This solid was identified as potassium perchlorate. Item 3 - Small plastic vial containign a small quantity of a white solid. This solid was identified as potassium nitrate.
p2024810	W061	Item 1 was identified as sulphur Item 2 was idenified as potassium perchlorate Item 3 was identified as potassium nitrate
p2024811	W061	The unknown sunstances were identified as sulphur (Item 1), potassium perchlorate (Item 2) and potassium nitrate (Item 3). Sulphur can be used in various commercial and industrial applications, however in explosives and fireworks manufacture it is used as a fuel, particularly as a component of black powder (gunpowder). Potassium perchlorate and potassium nitrate are both strong oxidising agents. Potassium nitrate is used in various commercial applications, such as fertilisers, but it is also the main ingredient in black powder (gun powder). Potassium nitrate and potassium perchlorate are common in pyrotechnic compositions.
p2024812	W061	The pale yellow powder Item 1 was consistent with molecular sulphur. The substances (items 2 and 3) were identified as potassium perchlorate (Item 2) and potassium nitrate (Item 3) respectively. Each of these substances have legitimate uses but they can also be used in the formulation of explosive or pyrotechnic mixtures. Sulphur can be used as a fuel when combined with an oxidiser in, for example, black powder. Potassium perchlorate and potassium nitrate are both oxidisers which can be combined with a fuel to produce a pyrotechnic mixture. For example potassium nitrate is a major component of black powder.
p2024814	W108	Item #1 contained Sulfur, a fuel. Item #2 contained potassium perchlorate, an oxidizer. Item #3 contained potassium nitrate, an oxidizer.
p2024815	W043	Exhibit 1 contained sulfur. Exhibit 2 contained potassium perchlorate. Exhibit 3 contained potassium nitrate.
p2024816	W043	Exhibit 01 contained powdered sulfur. Exhibit 02 contained potassium perchlorate. Exhibit 03 contained potassium nitrate.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024817	W043	Exhibit 1 contained sulfur. Exhibit 2 contained potassium perchlorate. Exhibit 3 contained potassium nitrate. The following techniques were used in the examination of one or more of the exhibits described above: Visual and microscopical examinations, ignition susceptibility testing (IST), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy-energy dispersive spectroscopy (SEM-EDS), and x-ray diffraction (XRD).
p2024818	W009	Item 1: Sulfur identified. Item 2: Potassium perchlorate identified. Item 3: Potassium nitrate identified. Sulfur is a pale-yellow solid with many industrial applications. Sulfur is also a component of many explosive/pyrotechnic compositions, including Black Powder. In addition, sulfur can be used as a fungicide. Potassium perchlorate is an oxidizing material ('oxidizer') which is used in a variety of explosive/pyrotechnic compositions, including flash powders. Potassium perchlorate is also used as rocket propellant and in certain medical applications. Potassium nitrate (saltpeter) is an oxidizing material ('oxidizer') which is used in a variety of explosive/pyrotechnic compositions, including Black Powder. Potassium nitrate is also used as fertilizer and tree stump remover.

<table>
<tr><th>UTIC</th><th>Webcode</th><th>How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).</th></tr>
<tr><td>p2024821</td><td>W144</td><td>
1-The following was received:
<table>
<tr><td>Sample identification</td><td>Material received</td><td>Origin of material</td></tr>
<tr><td>ITEM #1</td><td>Solid, yellow powder material with a sulfurous
odor.</td><td>Sample of unknown material</td></tr>
<tr><td>ITEM #2</td><td>White solid powder, hygroscopic in appearance</td><td>Sample of unknown material</td></tr>
<tr><td>ITEM #3</td><td>Crystalline solid material, white in color.</td><td>Sample of unknown material</td></tr>
</table>
2-Under the methodology used, the following findings were made:
<table>
<tr><td>Sample identification</td><td>Chemical findings</td></tr>
<tr><td>ITEM #1</td><td>Corresponds to sulfur</td></tr>
<tr><td>ITEM #2</td><td>Corresponds to potassium perchlorate</td></tr>
<tr><td>ITEM #3</td><td>Corresponds to potassium nitrate</td></tr>
</table>
3-According to the results of the analyzes carried out, it is interpreted that:

3.1-The material identified as Item #1 corresponds to Sulfur. Sulfur is widely used as a fuel in pyrotechnic compositions, especially in black powder.
3.2-The material identified as Item # 2 corresponds to potassium perchlorate. Potassium perchlorate is a strong oxidizer widely used in pyrotechnic compositions, especially in flash powders.
3.3-The material identified as Item #3 corresponds to potassium nitrate. Potassium nitrate is an oxidizer used in pyrotechnic compositions, especially black powder.
</td></tr>
</table>

<table>
<tr><th>UTIC</th><th>Webcode</th><th>How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).</th></tr>
<tr><td>p2024822</td><td>W144</td><td>

In the evidence received that corresponds to a yellow solid material identified as ITEM 1 p2024822, it was determined that its physical and chemical characteristics allow it to be identified as elemental sulfur.
Elemental sulfur is used as fuel in black powder and in other pyrotechnic compositions, among other uses of this substance.
In the evidence received that corresponds to a white solid powder identified as ITEM 2 p2024822, it was determined that its physical and chemical characteristics allow it to be identified as potassium perchlorate.
Potassium perchlorate is used as an oxidizer in flash powder and in other pyrotechnic compositions, among other uses of this substance.
In the evidence received that corresponds to a white solid crystalline material identified as ITEM 3 p2024822, it was determined that its physical and chemical characteristics allow it to be identified as potassium nitrate.
Potassium nitrate is used as an oxidizer in black powder and other pyrotechnic compositions, among other uses of this substance.

</td></tr>
<tr><td>p2024823</td><td>W144</td><td>
The following table shows the findings obtained with respect to the materials received as evidence.
<table>
<tr><th>Sample identification</th><th>Morphological, physical and chemical findings</th></tr>
<tr><td>Item #1</td><td>Yellow powder material, with a characteristic sulfur odor.
Sommer test, positive for elemental sulfur.
The elemental composition of Item #1 is: S
Item #1 is determined to correspond to sulfur.</td></tr>
<tr><td>Item #2</td><td>White powder material. Odorless
The elemental composition of Item #2 is: K, Cl, O
Item #2 is determined to correspond to potassium perchlorate.</td></tr>
<tr><td>Item #3</td><td>White powder material. Odorless
The elemental composition of Item #3 is: K, N, O
Item #3 is determined to correspond to potassium nitrate.</td></tr>
</table>
It is interpreted that:
• The material identified as Item #1 corresponds to sulfur.
• The material identified as Item #2 corresponds to potassium perchlorate.
• The material identified as Item #3 corresponds to potassium nitrate.

◦ Technical opinion:
The compounds received are widely used in different pyrotechnic compositions. Additionally, they can be used in different proportions in combination with other compounds for the production of black powder (potassium nitrate, carbon and sulfur) and/or various types of flash powder (for example, a composition based on potassium perchlorate, aluminum and sulfur or a composition based on potassium nitrate, aluminum and sulfur). Both, black powder and flash powder are explosive compositions, commonly used in fireworks that deflagrate, but when confined they can cause an explosion.
</td></tr>
</table>

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024824	W193	On analysis, I found:- i) Item 1 to be Sulfur, which is consistent with fuel. ii) Item 2 to be Potassium Perchlorate, which is consistent with oxidizer. iii) Item 3 to be Potassium Nitrate, which is consistent with oxidizer.
p2024825	W181	Item 1 is sulfur. It is a chemical element that exit in a solid state and has a yellow wish color. It is one of the basic ingredients in many pyrotechnic compositions and its main function is to increase the speed of deflagration. Item 2 is potassium perchlorate. It is a highly oxiditing salt used in most pyrotechnic compositions and chlorate explosive mixtures, due to its excellent performance and stability. Item 3 is potassium nitrate and carbohydrate. Potassium nitrate is a characteristic compound of black powder although it is also used as an additive in the food industry. It is a strong oxidizer that releases energy when exposed to heat. Carbohydrate and potassium nitrate is a used as a basic propellant in the field of experimental rocketry where carbohydrate is a fuel and potassium nitrate acts as oxidizer.
p2024826	W189	Item 1 was identified as the fuel sulfur. Item 2 was identified as the oxidizer potassium perchlorate. Item 3 was identified as the oxidizer potassium nitrate. The following analytical techniques were used during the analysis of Item 1: visual and microscopic inspection, X-ray diffractometry, and scanning electron microscopy with energy dispersive X-ray spectroscopy. The following analytical techniques were used during the analysis of Items 2 and 3: visual and microscopic inspection, Fourier transform infrared spectroscopy, and X-ray diffractometry.
p2024827	W189	Item 1 was identified as sulfur, a fuel. Item 2 was identified as the oxidizer potassium perchlorate. Item 3 was identified as the oxidizer potassium nitrate.
p2024828	W189	Item 1 contained sulfur, a fuel. Item 2 contained the oxidizer potassium perchlorate. Item 3 contained the oxidizer potassium nitrate.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024829	W189	Item 1 contained sulfur, a fuel. Item 2 contained the oxidizer potassium perchlorate. Item 3 contained the oxidizer potassium nitrate.
p2024830	W189	Item 1 was identified as sulfur, a fuel. Item 2 was identified as the oxidizer potassium perchlorate. Item 3 was identified as the oxidizer potassium nitrate.
p2024834	W006	Item 1 was identified as sulfur, a fuel. Item 2 was identified as potassium perchlorate, an oxidizer. Item 3 was identified as potassium nitrate, an oxidizer.
p2024835	W006	Item 1 was identified as sulfur, a fuel. Item 2 was identified as potassium perchlorate, an oxidizer. Item 3 was identified as potassium nitrate, an oxidizer. In general, an energetic mixture can be created by mixing a fuel(s) and oxidizer(s) at specific ratios.
p2024836	W170	According to the physical, chemical and instrumental analyzes, it was concluded that the samples analyzed contain: Item # 1 contains the elements sulfur (S) and aluminum (Al). Item # 2 contain potassium perchlorate ($KClO_4$). Item # 3 contain potassium nitrate (KNO_3).
p2024837	W170	According to the physical, chemical and instrumental analyzes, it was concluded that the samples analyzed contain: Item # 1 contains the elements sulfur (S) and aluminum (Al) Item # 2 contain potassium perchlorate ($KClO_4$). Item # 3 contain potassium nitrate (KNO_3).
p2024838	W170	According to the physical, chemical and instrumental analyzes, it was concluded that the samples analyzed contain: Item # 1 contains the elements sulfur (S) and aluminum (Al) Item # 2 contain potassium perchlorate ($KClO_4$). Item # 3 contain potassium nitrate (KNO_3).

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024839	W170	According to the physical, chemical and instrumental analyzes, it was concluded that the samples analyzed contain: Item # 1 contains the elements sulfur (S) and aluminum (Al). Item # 2 contain potassium perchlorate ($KClO_4$). Item # 3 contain potassium nitrate (KNO_3).
p2024840	W170	According to the physical, chemical and instrumental analyzes, it was concluded that the samples analyzed contain: Item # 1 contains the elements sulfur (S) and aluminum (Al) Item # 2 contain potassium perchlorate ($KClO_4$). Item # 3 contain potassium nitrate (KNO_3).
p2024841	W262	No explosives/explosive residues were detected in Exhibits 1, 2, or 3. Sulfur was identified in Exhibit 1. Potassium perchlorate was identified in Exhibit 2. Potassium nitrate was identified in Exhibit 3. Sulfur, potassium perchlorate, and potassium nitrate have numerous uses, including the manufacturing of explosives along with legitimate industrial/agricultural uses.
p2024842	W262	No explosives or explosive residues were detected in Exhibits 1-3. Sulfur (fuel) was identified in Exhibit 1. Potassium perchlorate (oxidizer) was identified in Exhibit 2. Potassium nitrate (oxidizer) was identified in Exhibit 3.
p2024843	W262	Sulfur (a fuel) was identified in Exhibit 1. Potassium Perchlorate (KClO4, an oxidizer) was identified in Exhibit 2. Potassium Nitrate (KNO3, an oxidizer) was identified in Exhibit 3.
p2024844	W262	No explosives or explosive residues were detected in Exhibits 1-3. Sulfur was identified in Exhibit 1. Potassium perchlorate (KClO4) was identified in Exhibit 2. Potassium nitrate (KNO3) was identified in Exhibit 3. Sulfur, potassium perchlorate, and potassium nitrate may each be used in the manufacture of explosives, along with legitimate industrial and agricultural uses.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024845	W262	No explosives/explosive residues were detected in Exhibits 1, 2, or 3. Sulfur was identified in Exhibit 1. Sulfur has numerous uses, including the manufacture of explosives along with legitimate industrial/agricultural uses. Potassium perchlorate was identified in Exhibit 2. Potassium perchlorate has numerous uses, including the manufacture of explosives along with legitimate industrial/agricultural uses. Potassium nitrate was identified in Exhibit 3. Potassium nitrate has numerous uses, including the manufacture of explosives along with legitimate industrial/agricultural uses. This is a corrected report for [redacted], approved on 07NOV2024. The Findings section for Exhibits 1, 2, and 3 was changed because of inaccurate use statements for the chemicals identified.
p2024846	W262	Sulfur, a fuel, was identified in Exhibit 1. Potassium Perchlorate, an oxidizer, was identified in Exhibit 2. Potassium Nitrate, an oxidizer, was identified in Exhibit 3. The combination of these materials (Sulfur combined with Potassium Perchlorate or Potassium Nitrate) may be found in fuel-oxidizer explosives.
p2024847	W262	Sulfur (fuel) was identified in Exhibit 1. Potassium perchlorate (oxidizer) was identified in Exhibit 2. Potassium nitrate (oxidizer) was identified was identified in Exhibit 3. The combination of Exhibit 1 with Exhibit 2 or Exhibit 3, or the combination of Exhibit 1 with Exhibit 2 and Exhibit 3 may be found in a fuel-oxidizer explosive.
p2024848	W262	Sulfur was identified in Exhibit 1. Potassium perchlorate was identified in Exhibit 2. Potassium nitrate was identified in Exhibit 3. The combination of sulfur (fuel), potassium perchlorate (oxidizer), and potassium nitrate (oxidizer) may be used in improvised fuel-oxidizer explosives.
p2024849	W262	No explosives/explosive residues were detected in Exhibits 1, 2, or 3. Sulfur was identified in Exhibit 1. Potassium perchlorate was identified in Exhibit 2. Potassium nitrate was identified in Exhibit 3. Sulfur, potassium perchlorate, and potassium nitrate have numerous uses, including the manufacture of explosives along with legitimate industrial/agricultural uses.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024850	W262	No explosives/explosive residues were detected in Exhibit 1. Sulfur was identified. No explosives/explosive residues were detected in Exhibit 2. Potassium Perchlorate was identified. No explosives/explosive residues were detected in Exhibit 3. Potassium Nitrate was identified. Sulfur, Potassium Perchlorate, and Potassium Nitrate each have numerous uses, including the manufacture of explosives along with legitimate industrial and/or agricultural uses.
p2024851	W262	No explosives/ explosive residue were detected in exhibits 1-3. Sulfur was identified in Exhibit 1. Potasisum perchlorate was identified in Exhibit 2. Potassium nitrate was identified in Exhibit 3. Sulfur, potassium perchlorate and potassium nitrate have numerous uses, including the manufature of explosives along with legitimate industrial/ agricultural uses.
p2024852	W262	Sulfur (fuel) was identified in Exhibit 1. Sulfur, in combination with materials in Exhibits 2 and/or 3, may be found in Black Powder or Black Powder Substitutes containing sulfur. Potassium perchlorate (oxidizer) was identified in Exhibit 2. Potassium perchlorate, in combination with materials in Exhibits 1 and/or 3, may be found in Black Powder Substitutes containing sulfur or Sulfur-free Black Powder Substitutes. Potassium nitrate (oxidizer) was identified in Exhibit 3. Potassium nitrate, in combination with materials in Exhibits 1 and/or 2, may be found in Black Powder, Black Powder Substitutes containing sulfur, or Sulfur-free Black Powder Substitutes. These materials have numerous uses, including the manufacture of explosives, along with legitimate (industrial/agricultural) uses.
p2024853	W128	Item 1 The evaluation of the analysis results revealed the detection of elemental sulphur. Item 2 The evaluation of the analysis results revealed the detection of potassium perchlorate. Item 3 The evaluation of the analysis results revealed the detection of potassium nitrate.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024854	W132	Item 1 containied a yellow powder. The yellow powder was analysed and found to contain Sulfur. Item 2 contained a white powder. The white powder was analysed and found to contain Potassium Perchlorate. Item 3 contained white crystalline material. The white material was analysed and found to contain Potassium Nitrate. Sulfur is used as a fungicide and pesticide and in the manufacture of pharmaceutical and industrial products. Potssium Perchlorate is an oxidiser and has uses in explosives, fireworks and photography. Potassium Nitrate is an oxidiser found in Black Powder and has uses in fireworks, in fertilisers and as a preservative in food. An explosive mixture consists of an oxidiser and a fuel. Potassium Perchlorate and Potassium Nitrate are oxidisers. Sulfur is a fuel but can be added to explosive mixtures to increase the sensitivity of the mixture. An explosive mixture (e.g. Potassium Nitrate, Potassium Perchlorate and Sulfur) is controlled under the explosives legislation in our jurisdiction. Potassium Nitrate is controlled under explosives legislation in our jurisdiction.
p2024855	W160	Item 1 consists of approximately 0.5147g of a yellow powder, consistent with being sulphur. Item 2 consists of approximately 0.5232g of a white powder, consistent with being potassium perchlorate. Item 3 consists of approximately 0.5093g of a white crystaline powder, consistent with being potassium nitrate. When combined, the above components could be used to manfacture an explosive compound such as black powder or flash powder.
p2024856	W153	The analyzes carried out make it possible to establish that: • item 1 contains sulfur. • item 2 contains potassium perchlorate. • item 3 contains potassium nitrate. The products identified are all chemical precursors of explosives : The combination of potassium nitrate and sulfur is part of the composition of black powder (with carchoal). Potassium nitrate is also used in the composition of homemade potassium nitrate/sugar explosives. Potassium perchlorate is used in the composition of pyrotechnic powders known as “flash” powders (with aluminium powder) used in commercial fireworks.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024857	W092	Item #1 was found to contain 0.5 g of solid containing sulfur. Item #2 was found to contain 0.5 g of solid containing potassium perchlorate. Item #3 was found to contain 0.5 g of solid containing potassium nitrate.
p2024859	W002	Item 1 is a yellow powder identified as sulfur. Item 2 is a white crystalline powder identified as potassium perchlorate. Item 3 is a white cyrstalline powder identified as potassium nitrate.
p2024860	W002	Item 1 was a green powder identified as sulfur. Item 2 was a white powder identified as potassium perchlorate. Item 3 was a white powder identified as potassium nitrate.
p2024862	W224	Item 1 was identified as sulfur, a fuel. Sulfur is very reducing and can boost an oxidation-reduction reaction. Item 2 was identified as potassium perchlorate, an oxidizier. Item 3 was identified as potassium nitrate, an oxidizier. Potassium perchlorate, potassium nitrate and sulfur can enter the composition of pyrotechnic devices. The decomposition regime of the mixture will depend on priming and confinement. It could be a combustion, a blast or a detonation. The pyrotechnic effects will also depend on the ratios between the different constituents of the mixture.
p2024863	W093	The chemical analysis on item 1 as revealed the presence of sulfur. Sulfur can be used as a fuel in some pyrotecnics, as a component in black powder mixture or as a fertilizer. The chemical analysis on item 2 as revealed the presence of potassium perchlorate. Potassium perchlorte can be used as an oxyder in some pyrotecnics. The chemical analysis on item 3 as revealed the presence of potassium nitrate. Potassium nitrate can be used as an oxyder in some pyrotecnics, as a component in black powder mixture or as a fertilizer.
p2024866	W135	Lab item 1: Sulfur was identified. Lab item 2: Potassium perchlorate was identified. Lab item 3: Potassium nitrate was identified.
p2024867	W120	Results: There were insufficient laboratory capabilities to identify the powders for Items 1-3; Exhibits 1-3. Conclusions: Items 1-3; Exhibits 1-3: No conclusion can be reached due to limited instrumental capabilities.

<table>
<tr><th>UTIC</th><th>Webcode</th><th>How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).</th></tr>
<tr><td>p2024868</td><td>W012</td><td>Examinations on portions of Item 1-1 (FTS-24-EXP Item 1 p2024868) identified sulfur.
Examinations on portions of Item 1-2 (FTS-24-EXP Item 2 p2024868) identified potassium perchlorate.
Examinations on portions of Item 1-3 (FTS-24-EXP Item 3 p2024868) indicated and identified potassium nitrate.
It should be noted that Item 1-1, Item 1-2 and Item 1-3 are components that can be used in the manufacturing of low explosives. Some common low explosives include black powders, black powder substitutes, smokeless powders and fuel/oxidizer mixtures such as pyrotechnic mixtures or flash powders.</td></tr>
<tr><td>p2024869</td><td>W105</td><td>The three materials identified (sulfur, potassium perchlorate and potassium nitrate) are each components in explosives mixtures. Sulfur is a fuel, potassium perchlorate and potassium nitrate are both oxidizers. Individually they are not explosive. Each are used in various explosive formulations. Most formulations utilizing these materials also include materials which were not submitted for analysis.</td></tr>
<tr><td>p2024870</td><td>W027</td><td>Item 1 was identified as sulfur which can be used as a fuel in an explosive device.
Item 2 was identified as potassium perchlorate and Item 3 was identified as potassium nitrate. These components can be used as oxidizers in an explosive device.</td></tr>
<tr><td>p2024871</td><td>W027</td><td>Information:
Samples of the submitted yellow (Item 1) and white (Items 2 and 3) powders were analyzed for the possible identification of explosive materials using polarized light microscopy, infrared spectroscopy, and gas chromatography-mass spectrometry.

Results:
The following identifications and explosive material classifications were made:

<table>
<tr><td>Evidence</td><td>Contains</td><td>Classification</td></tr>
<tr><td>Item 1</td><td>Sulfur</td><td>Fuel</td></tr>
<tr><td>Item 2</td><td>Potassium perchlorate</td><td>Oxidizer</td></tr>
<tr><td>Item 3</td><td>Potassium nitrate</td><td>Oxidizer</td></tr>
</table>
</td></tr>
<tr><td>p2024873</td><td>W001</td><td>The fine yellow powder of Item 001.001 contains sulfur.
The fine white crystalline powder of Item 001.002 contains potassium perchlorate.
The white granular powder of Item 001.003 contains potassium nitrate.
Sulfur, potassium perchlorate, and potassium nitrate are used in the manufacture of pyrotechnic devices.</td></tr>
<tr><td>p2024874</td><td>W096</td><td>The yellow powder of Item 1 contains sulfur.
The white powder of Item 2 contains potassium perchlorate.
The white powder of Item 3 contains potassium nitrate.
Potassium nitrate, potassium perchlorate and sulfur are used in the manufacture of pyrotechnic devices.</td></tr>
</table>

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024875	W123	Item 1 consists of a plastic vial containing yellow powder. The yellow powder was identified as sulfur. Sulfur is a fuel which can be used in flash powders, pyrotechnics and improvised explosive devices. Item 2 consists of a plastic vial containing white crystalline material. The white crystalline material was identified as potassium perchlorate. Potassium perchlorate is an oxidizer which can be used in flash powders, pyrotechnics and improvised explosive devices. Item 3 consists of a plastic vial containing white crystalline material. The white crystalline material was identified as potassium nitrate. Potassium nitrate is an oxidizer which can in used in flash powders, pyrotechnics and improvised explosive devices.
p2024876	W209	- Item 01 contains Sulphur, wich is one of the components of black powder, the later is considered as an explosive material that propels projectiles. - Item 02 contains Potassium Perchlorate, wich is a strong oxidizer material, and it can be used in the manufacture of homemade explosive materials. - Item 03 contains Potassium Nitrate, wich is an oxidizer material, and it can be used in the manufacture of explosive materials.
p2024877	W053	Question to answer: Please examine the submitted items in order to identify any explosive materials present. None of the submitted items is an explosive material. Items 1 is identified by means of XRF and XRD as mainly Sulphur. Items 2 is identified by means of XRF and XRD as mainly Potassium perchlorate. Items 3 is identified by means of XRF and XRD as mainly Potassium nitrate. Raman spectroscopy confirms these results as well. These materials can be used as precursors for pyrotechnic mixtures, but also have other applications that are not related to explosives. According to European regulation 2018/1148 (regulation on the marketing and use of explosives precursors, amending Regulation (EC) No 1907/2006 and repealing Regulation (EU) No 98/2013), a person is only allowed to have, buy, trade or use the potassium perchlorate of item 2 if he/she has a valid permit.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024878	W130	Results of examination 1. Laboratory Item #1 a. Visual and stereomicroscopic examination of solid material disclosed the presence of yellow powdery solid material. b. Sulfur was identified using instrumental analysis (X-Ray Diffraction Analysis). 2. Laboratory Item #2 a. Visual and stereomicroscopic examination of solid material disclosed the presence of white clumpy and loose crystalline solid material. b. Potassium perchlorate was identified using instrumental analysis (X-Ray Diffraction Analysis). 3. Laboratory Item #3 a. Visual and stereomicroscopic examination of solid material disclosed the presence of white translucent particles. b. Potassium nitrate was identified using instrumental analysis (X-Ray Diffraction Analysis). Interpretation of results 1. Sulfur can be used as a fuel in explosive mixtures and is commonly found in, but not limited to, black powder and some black powder substitutes. 2. Potassium perchlorate is an oxidizer that can be found as a component in low explosive mixtures, but can also be used in some air bags and as a chemical reagent. 3. Potassium nitrate is an oxidizer that can be found as a component in low explosive mixtures, but can also be used in some fertilizers and tree stump removers. 4. With current methods and technologies available at the Police Laboratory, a complete analysis of some materials may not be possible. In some samples, there may be components that cannot be detected or identified.
p2024879	W130	1. Item #1: Sulfur was identified. 2. Item #2: Potassium perchlorate was identified. 3. Item #3: Potassium nitrate was identified. 1. Sulfur can be used as a fuel in black powders, some propellants and some fireworks. 2. Potassium perchlorate is a chemical oxidizer that is found in, but not limited to, fireworks, propellants, and flash powders. 3. Potassium nitrate is a chemical oxidizer that is found in, but not limited to, black powder, some fireworks and some propellants.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024880	W150	Examinations of item #1 revealed sulfur. Examinations of item #2 revealed potassium perchlorate. Examinations of item #3 revealed potassium nitrate.
p2024881	W025	The yellow powder in item 1 contained sulfur. The white powder in item 2 contained potassium perchlorate. The white powder in item 3 contained potassium nitrate. DISCUSSION: Mixing an oxidizer, such as potassium perchlorate and/or potassium nitrate, with a fuel, such as sulfur, and burning the mixture in a confined space may cause an explosion.
p2024882	W017	Conclusions: 1. Exhibit Item 1 consists of a very fine yellow powder identified as sulfur powder. Sulfur powder is a fuel and a tinder, commonly encountered in commercial pyrotechnics, black powder and some black powder substitutes. Sulfur powder can be purchased from, but not limited to, hardware stores, pharmacies and internet retailers such as Amazon, and used as a precursor to make homemade flash powder, black powder or pyrotechnic mixtures, but also has other legitimate household uses such as, but not limited to, insecticide and fungicide. To make a homemade pyrotechnic mixture, sulfur powder must be mixed with other strong oxidizing reagents, such as, but not limited to, potassium perchlorate (see conclusion 2) and/or potassium nitrate (see conclusion 3). 2. Exhibit Item 2 consists of a white powder identified as potassium perchlorate. Potassium perchlorate is a strong oxidizer commonly used in commercially manufactured consumer fireworks, such as flash powder. Potassium perchlorate can be purchased from chemical reagents suppliers or internet retailers, and used as a precursor to make homemade pyrotechnic mixtures, but also has other legitimate household uses such as photography and as a pharmaceutical agent for hyperthyroidism treatment. Potassium perchlorate is a Restricted Component as defined by Part 20 of the [redatced]. To make a homemade pyrotechnic mixture, potassium perchlorate must be mixed with other combustible reagents suitable as fuels to make an explosive, such as, but not limited to, sulfur powder (see conclusion 1). 3. Exhibit Item 3 consists of a white granular powder identified as potassium nitrate. Potassium nitrate is a strong oxidizer commonly used in commercially manufactured consumer fireworks and firearms propellant powders, such as black powder. Potassium nitrate can be purchased from hardware supply stores or horticulture shops and used as a precursor to make homemade black powder or pyrotechnic mixtures, but also has other legitimate household uses such as an agricultural fertilizer, tree stump remover or pickling salt. Potassium nitrate is a Restricted Component as defined by Part 20 of the [redacted]. To make homemade black powder or a pyrotechnic mixture, potassium nitrate must be mixed with other combustible reagents suitable as fuels to make an explosive, such as, but not limited to, sulfur powder (see conclusion 1).

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024883	W013	Item 1 consists of elemental sulfur. It does not deflagrate and can be used as a fuel source in low explosives such as black powder, sulfur containing black powder substitutes and some pyrotechnics. Item 2 consists of potassium perchlorate. It does not deflagrate and can be used as an oxidizer in low explosives such as black powder substitutes, and some pyrotechnics. Item 3 consists of potassium nitrate. It does not deflagrate and can be used as an oxidizer in low explosives such as black powder, black powder substitutes, and some pyrotechnics. These items are not inclusive to low explosives and can be commonly used in non-explosive items.
p2024884	W085	**Sulfur was identified in Item 1.** Sulfur is not independently explosive; however, it is a fuel commonly used in explosive mixtures. **Potassium perchlorate was identified in Item 2.** Potassium perchlorate is not independently explosive; however, it is an oxidizer commonly used in explosive mixtures. **Potassium nitrate was identified in Item 3.** Potassium nitrate is not independently explosive; however, it is an oxidizer commonly used in explosive mixtures.
p2024885	W051	"Item 1": Approximately 0.6 grammes (g) of yellow solids. 1. Some of the yellow solids were analysed and found to be sulfur. "Item 2": Approximately 0.5 g of white solids. 2. Some of the white solids were analysed and found to be potassium perchlorate. "Item 3": Approximately 0.5 g of white solids. 3. Some of the white solids were analysed and found to be potassium nitrate. Note: Common ingredients of low explosives include oxidising agents such as nitrates and perchlorates and fuels such as sulfur.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024886	W016	Item 1: A pale yellow fine granular (powdery) material was submitted for analysis. In the sample analyzed, sulfur was found. Sulfur is a component of some explosives; however, it can also be found in other materials. Item 2: A white fine granular (powdery) material composed of clear, colorless, globular particles was submitted for analysis. In the sample analyzed, potassium perchlorate was found. Potassium perchlorate is a component of some explosives; however, it can also be found in other materials. Item 3: A white fine granular (powdery) material composed of large, irregularly shaped, clear, colorless particles was submitted for analysis. In the sample analyzed, potassium nitrate was found. Potassium nitrate is a component of some explosives; however, it can also be found in other materials.
p2024887	W175	Stereoscopic, SEM/EDS, XRD, and FTIR analysis of Item 001-01 identified sulfur. Stereoscopic, SEM/EDS, XRD, and FTIR analysis of Item 001-02 identified potassium perchlorate. Stereoscopic, SEM/EDS, XRD, and FTIR analysis of Item 001-03 identified potassium nitrate.
p2024889	W162	Item 1 consists of sulfur. Sulfur has many applications and can, among other things, be used to manufacture explosives. Item 2 consists of Potasium perchlorate. Potasium perchlorate is frequently used to manufacture explosives. Item 3 consists of Potasium nitrate. Potasium nitrate has many applications and can, among other things, be used to manufacture explosives. Reference to national laws and regulations.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024890	W055	1. Exhibit 1 is a plastic vial containing a yellow powder identified as sulfur. Sulfur has numerous uses, including the manufacture of explosives along with legitimate industrial uses. 2. Exhibit 2 is a plastic vial containing a white powder identified as potassium perchlorate. Potassium perchlorate has numerous uses, including the manufacture of explosives along with legitimate industrial uses. 3. Exhibit 3 is a plastic vial containing a white powder identified as potassium nitrate. Potassium nitrate has numerous uses, including the manufacture of explosives along with legitimate industrial uses.
p2024891	W055	1. Exhibit 1 (sample of unknown material) consisted of a quantity of loose yellow powder which was identified as sulfur (S). 2. Exhibit 2 (sample of unknown material) consisted of a quantity of loose white powder which was identified as potassium perchlorate (KClO4). 3. Exhibit 3 (sample of unknown material) consisted of a quantity of loose white powder which was identified as potassium nitrate (KNO3).
p2024893	W047	Exhibit 139 (FTS Item 1) consists of one plastic micro-centrifuge tube containing yellow powder that was identified as sulfur. Exhibit 140 (FTS Item 2) consists of one plastic micro-centrifuge tube containing white powder that was identified as potassium perchlorate. Exhibit 141 (FTS Item 3) consists of one plastic micro-centrifuge tube containing white powder that was identified as potassium nitrate.
p2024895	W007	Item #1 contains sulfur. Item #2 contains potassium perchlorate. Item #3 contains potassium nitrate. All three are chemicals that can be used as components in various explosives and pyrotechnic mixtures.
p2024896	W007	Item 1. A yellow powder found to contain sulfur. Item 2. A white crystalline material found to contain potassium perchlorate. Item 3. A white crystalline material found to contain potassium nitrate. Sulfur has many commercial purposes and can be used in improvised explosive devices as a fuel. Potassium perchlorate and potassium nitrate have many commercial purposes and each can be used in improvised explosive devices as an oxidizer.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2024897	W007	Item 1 contained sulfur. Item 2 contained potassium perchlorate. Item 3 contained potassium nitrate. Sulfur can be used as a fuel in some explosive mixtures. Potassium perchlorate and potassium nitrate can be used as oxidizers in some explosive mixtures.
p2024898	W007	Item 1 was found to contain sulfur. Item 2 was found to contain potassium perchlorate. Item 3 was found to contain potassium nitrate. All three of these chemicals have a number of commerical uses, including as compenents that can be used in explosive devices.

15) How long did it take to complete this test (in hours)? Please report actual analytical hours only.

16) Did you find this test to be a fair test of the process of the examination and interpretation of low explosives?

A) ◯ Yes

B) ◯ No

UTIC	Webcode	How long did it take to complete this test (in hours)? Please report actual analytical hours only.	Did you find this test to be a fair test of the process of the examination and interpretation of low explosives?
p2024801	W182	4	Yes
p2024802	W031	10 hours	Yes
p2024803	W119	2	Yes
p2024804	W061	8 hours	No
p2024805	W061	4	Yes
p2024807	W061	3 hr 15 min	Yes
p2024808	W061	8	Yes
p2024809	W061	5	Yes
p2024810	W061	2	Yes
p2024811	W061	4	Yes
p2024812	W061	5 hrs	Yes
p2024814	W108	20	Yes
p2024815	W043	4	Yes

UTIC	Webcode	How long did it take to complete this test (in hours)? Please report actual analytical hours only.	Did you find this test to be a fair test of the process of the examination and interpretation of low explosives?
p2024816	W043	4	Yes
p2024817	W043	4	Yes
p2024818	W009	8 h	Yes
p2024821	W144	5 hours	Yes
p2024822	W144	8	Yes
p2024823	W144	10 hours	Yes
p2024824	W193	100hours	Yes
p2024825	W181	40	Yes
p2024826	W189	7	Yes
p2024827	W189	2	Yes
p2024828	W189	2	Yes
p2024829	W189	3	Yes
p2024830	W189	2	Yes
p2024834	W006	6	Yes
p2024835	W006	6	Yes
p2024836	W170	72	Yes
p2024837	W170	72	Yes
p2024838	W170	12	Yes
p2024839	W170	72	Yes
p2024840	W170	72	Yes
p2024841	W262	5	Yes
p2024842	W262	4	Yes
p2024843	W262	8	Yes
p2024844	W262	6	Yes
p2024845	W262	16	Yes
p2024846	W262	5	Yes
p2024847	W262	12	Yes
p2024848	W262	4	Yes
p2024849	W262	8	Yes
p2024850	W262	3	Yes
p2024851	W262	6	Yes
p2024852	W262	8	Yes
p2024853	W128	20	Yes
p2024854	W132	8	Yes
p2024855	W160	13 hours	Yes
p2024856	W153	16 hours	Yes
p2024857	W092	20 hours	Yes
p2024859	W002	8	Yes
p2024860	W002	3	Yes
p2024862	W224	40	Yes

UTIC	Webcode	How long did it take to complete this test (in hours)? Please report actual analytical hours only.	Did you find this test to be a fair test of the process of the examination and interpretation of low explosives?
p2024863	W093	2	Yes
p2024866	W135	5	Yes
p2024867	W120	16	No
p2024868	W012	5	Yes
p2024869	W105	8	Yes
p2024870	W027	24	Yes
p2024871	W027	15	Yes
p2024873	W001	10 hours	Yes
p2024874	W096	10	Yes
p2024875	W123	10	Yes
p2024876	W209	06 hours	Yes
p2024877	W053	8,5 hours	Yes
p2024878	W130	35	Yes
p2024879	W130	21	Yes
p2024880	W150	3	Yes
p2024881	W025	12	Yes
p2024882	W017	5	Yes
p2024883	W013	32 hours	Yes
p2024884	W085	5 hours	Yes
p2024885	W051	8	Yes
p2024886	W016	12	Yes
p2024887	W175	6	Yes
p2024889	W162	2	Yes
p2024890	W055	8	Yes
p2024891	W055	12	Yes
p2024893	W047	5	Yes
p2024895	W007	2 hours	Yes
p2024896	W007	12	Yes
p2024897	W007	8	Yes
p2024898	W007	5	Yes

17) How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.

Additionally, this question is a means to provide you with an opportunity to explain or include information about your findings or interpretation, as needed. In order to maintain confidentiality, please refrain from including identifying information specific to your laboratory.

UTIC	Webcode	How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.	FTS Response
p2024803	W119	Sample 1: Sulfur can be used as a fuel or a tinder to make an explosive mixture more sensitive so “other” was selected.	Thank you for clarifying your response.
p2024804	W061	Bulk low explosives received in the laboratory are typically mixtures of an oxidiser and a fuel. This test scenario was more akin to precursor/unknown chemical identification.	Thank you for the suggestion. We are limited in what mixtures and quantities we can safely ship.
p2024848	W262	Present a case scenario to help with approach to the analytical question.	FTS does not include case scenarios as they are entirely contrived. Evidence significance and interpretation are not assessed by FTS.
p2024851	W262	Some compounds have mutiple uses in low explosive vs high explosive vs improvised and it's not clear if questions 7, 10 and 13 are specific only to low explosives; I would like clarity on it.	Yes, as this a low explosives PT, this is what we are referring to when asking what type of energetic material is present in those questions.
p2024852	W262	The test covered possible real world incidents.	
p2024853	W128	The test was appropriate.	
p2024855	W160	The inclusion of a negative sample would be useful.	Thank you for the suggestion!
p2024856	W153	A scenario could usefully be added.	Please see FTS Response for p2024848.
p2024867	W120	I would like a box added for each Item in cases where our instrument(s) are out of service and no conclusions could be drawn. This was a rare instance where two of my instruments used to confirm samples were both out of service.	Thank you for the suggestion. It is not often that this occurs. This question (Q17) is an appropriate location to explain that results were unable to be submitted due to instrumental issues.

UTIC	Webcode	How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.	FTS Response
p2024869	W105	A scenario would have been helpful to draw final conclusions beyond a straight identification of materials.	Please see FTS Response for p2024848.
p2024870	W027	No suggestions. Sufficient sample sizes permitted multiple testing methods.	
p2024873	W001	provide mixtures like flash powder, black powder, etc., and not just single components	Thank you for the suggestion. We try to offer different PT items year to year.
p2024877	W053	To make it a bit more challenging, you could consider contaminating the material with a second substance (e.g. a mixture of KClO4 and KNO3).	Thank you for the suggestion. Please see FTS Response for p2024804.
p2024880	W150	For question #7 - Technically, Sulfur is a fuel. However, it can act as a tinder and as an oxidizer in some mixtures. I would have chosen fuel only but that's not necessarily true.	Thank you for clarifying your response.
p2024887	W175	Clarification: Sulfur in most energetic applications is used as a “tinder” or fuel. For example ammonium nitrate/sulfur or potassium chlorate/sulfur. Due to the valence structure of sulfur a duality exists and sometimes can act as an oxidizer. Reference Chemistry of Pyrotechnics: Basic Principles and Theory	Thank you for clarifying your response.