**Questionnaire**

September 2017

Dear Sir/Madam,

The Munitions Safety Information Analysis Center (MSIAC), on behalf of our member nations, is engaging the community to contribute towards an update to the report on current energetic materials suppliers (O-082).

**Purpose**

The results of this survey will provide input into a report that lists current manufactures of energetic materials and their capabilities. This is an opportunity for organisations in MSIAC, NATO and its allied partner nations[[1]](#footnote-1) to inform the community of their capabilities and availabilities. The updated catalogues will be an **open report** and will be made available to all contributors from the aforementioned nations. It will be an easy reference source used by Defence to identify manufacturers.

**Output**

An MSIAC **open report** consolidating manufactures from MSIAC, NATO and its allied partner nations.

**Timing**

Please complete and return the questionnaire by **10th November** **2017**.

To: Dr Matthew Andrews

Email: [m.andrews@msiac.nato.int](mailto:m.andrews@msiac.nato.int)

Post: MSIAC, S050, Building Z,

NATO HQ,

B-1110, Brussels,

BELGIUM

Should you require confirmation of the work plan or element please contact your country’s National Focal Point Officer (NFPO). Details can be found on our website:

<http://www.msiac.nato.int/contact-us/national-focal-point-officers-nfpos>

Thank you for taking the time to complete this questionnaire.

Regards,

Dr Matthew Andrews

Explanation of each section and requirements

Section 1 General information about the company

Section 2 Short statement about the company’s heritage in energetic materials ––––––manufacture, associated literature on the portfolio and information that can be supplied with the product

Section 3 This is a list of current materials, covering oxidisers, energetic liquids, polymers, primary and secondary energetics. The list has been cross-referenced against known standards, quality of the produced material, hazard classification and UN number. Delete the materials, specification, types and grades you are not manufacturing.

The provided list is not exhaustive so please feel free to amend the table to inform us of additional materials you are currently manufacturing.

Section 4-8 These Sections contains five key ingredients which we would like to directly compare; HMX, RDX, PETN, TNT and Nitrocellulose. The templates allow you to contribute further information about these materials to be included in the report.

Section 9 This is a blank template to allow you to provide further information for any materials you would like to highlight, for example, DNAN, NTO and/or TATB.

Section 10 Free text box to provide any other information

1. **General Information:** Please complete the following sections

|  |  |  |
| --- | --- | --- |
| **Location** | | |
|  | Name of Manufacturer |  |
| Address |  |
| Country |  |
| Website |  |
| **Point of Contact** | | |
|  | Name |  |
| Title/Role |  |
| Phone |  |
| E-mail |  |
| Fax |  |

1. **Company Information:** Please provide information where possible

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Summary** | | | | | | |
| *Statement covering experience in energetics manufacture* |  | | | | | |
| **Which materials do you manufacture for use by the Defence Industry? (Tick or check all applicable boxes)** | | | | | | |
| *Secondary Explosives* |  | *Energetic Liquids* |  | *Non-Energetic Polymers* |  |  |
| *Primary Explosives* |  | *Oxidisers* |  | *Non-Energetic Liquids* |  |  |
| *Energetic Polymers* |  | *Additives* |  | *Other (specify)* |  | |
| **Pamphlet (Sales literature)** | | | | | | |
| *Link to document* |  | | | | | |
| **Sale Requirements (please state any limitations)** | | | | | | |
| *Domestic* |  | | | | | |
| *Foreign* |  | | | | | |
| **Documents Supplied with Energetic Material (Yes/No/Other)** | | | | | | |
| *Certificate of Conformity* |  | | | | | |
| *Certificate of Analysis* |  | | | | | |
| *Explosive Hazard Data Sheet* |  | | | | | |
| *Material Safety Data Sheet* |  | | | | | |
| *Other*  *(please specify)* |  | | | | | |

Please provide, if able to do so, copies of any relevant information or examples of the aforementioned documents.

1. **Energetic Material Quick Check:** Identify which specifications and qualities you are able to produce. Please state yes (Y) or no (N) in the box next to the specification if you currently use a listed specification, or add additional one(s) in the ‘Other’ box.

For the material quality the highlighted colours correspond to the listed specification; these are there for guidance. Please **delete** materials/specifications/grades/classes/types you **don’t** manufacture.

Space is available at the end of the table for **you to add** additional materials; please follow the same format.

|  |  | ***Specification*** | | | | | | | ***Quality*** | | | |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | **CAS #** | **STANAG/**  **AOP** | **Y/N** | **MIL-SPEC** | **Y/N** | **DEF-STAN** | **Y/N** | **Other (Specify)** | **Type** | **Class** | **Grade** | **Other** | **Hazard Class** | **UN #** |
| Ammonium dinitramide | 140456-78-6 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ammonium nitrate | 6484-52-2 | 4024  Ed 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| Ammonium perchlorate | 7790-98-9 | 4299  Ed 1 |  | MIL-A-192B  Not 3 |  | 68-265 |  |  | A (1; 1)  B (2; 1) | 1 A/B  2  3 | A  B  C  D    1  2  3 |  |  |  |
| n-Butyl-2-nitratoethyl nitramine  (Bu-NENA) | 82486-82-6 | 4583  Ed 1 |  |  |  |  |  |  | 1  2  3  4 |  |  |  |  |  |
| 2,4,6,8,10,12-Hexanitro-hexaaza-isowurtzitane  (CL-20) | 135285-90-4 | 4566  Ed 1 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2,6-Diamino-3,5-dinitro-pyrazine-1-oxide  (DADNPO) | 194486-77-6 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2,4-Dinitro-anisole  (DNAN) | 119-27-7 | *4776*  *Ed 1* |  |  |  |  |  |  |  |  |  |  |  |  |
| 4,6-Dinitro-benzofuroxan  (DNBF) | 3524-08-1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2,4-Dinitro-toluene (DNT) | 121-14-2 | 4041  Ed 1 |  | A-A-59256  Not 2 |  |  |  |  |  |  |  |  |  |  |
| Ethylene glycol dinitrate | 628-96-6 |  |  | MIL-E-48225(AR)  Not 1 |  |  |  |  |  |  |  |  |  |  |
| Explosive D;  Ammonium picrate | 131-74-8 |  |  | MIL-A-166C  Not 3 |  |  |  |  |  | 1  2 |  |  |  |  |
| 1,1-Diamino-2,2-dinitro-ethylene  (FOX-7) | 145250-81-3 | *4798* |  |  |  |  |  |  |  |  |  |  |  |  |
| Guanylurea dinitramide  (GUDN) | 217464-38-5 | 4700  Ed 1 |  |  |  |  |  |  |  |  |  |  |  |  |
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| HMX | 2691-41-0 | 4284  Ed 1 |  | MIL-DTL-45444C  Not 1 |  | 13-111 |  |  | I  II  III  A  B  C | 1  2  3  4  5  6 | A  B |  |  |  |
| 2,2',4,4',6,6'-Hexanitro-stilbene  (HNS) | 20062-22-0 | 4230  Ed 1 |  | MIL-E-82903  Amm 1 |  | 13-180 |  |  | I  II  III  IV  V |  |  |  |  |  |
| Lead azide | 13424-46-9 |  |  | MIL-DTL-46225D |  |  |  |  |  |  |  |  |  |  |
| Lead styphnate | 15245-44-0 |  |  | MIL-DTL-757C Not 1 |  |  |  |  |  |  |  |  |  |  |
| Nitroglycerine  (NG) | 55-63-0 |  |  | MIL-N-246B(AR) |  |  |  |  | I  II |  |  |  |  |  |
| Nitrocellulose  (NC) | 9004-70-0 |  |  | MIL-DTL-244C |  |  |  |  | I  II  III | 1  2  3 | A (I/II)  B (I/II/III)  C (I/II)  D  E  F |  |  |  |
| Nitroguanidine  (NQ) | 556-88-7 | 4026  Ed 3 |  | MIL-N-494A(AR)  Not 2 |  |  |  |  | I  II | A  B  1  2 |  |  |  |  |
| 3-Nitro-1,2,4-triazol-5-one  (NTO) | 932-64-9 | 4543  Ed 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| PETN | 78-11-5 | 4023  Ed 5 |  | MIL-P-387C  Not 1 |  | 13-112 |  |  |  | 1  2  3  4  5 |  |  |  |  |
| RDX | 121-82-4 | 4022  Ed 4 |  | MIL-DTL-398D  Not 1 |  | 07-23 |  |  | A  B  I  II | 1  2  3  4  5  6  7  8 | 1 - 36  1 – Fine  1A  1B |  |  |  |
| Red P | 7723-14-0 | *4679* |  | MIL-211F |  |  |  |  |  | 1  2  3 |  |  |  |  |
| 1,3,5-Triamino-2,4,6-trinitro-benzene  (TATB) | 3058-38-6 |  |  |  |  | 13-500 |  |  | A |  |  |  |  |  |
| Triethylene glycol dinitrate  (TEGDN) | 111-22-8 | 4719  Ed 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| Tetryl | 479-45-8 | 4021  Ed 3 |  | MIL-T-339C  Not 3 |  | 07-26 |  |  |  |  |  |  |  |  |
| 2,4,6-Trinitro-toluene  (TNT) | 118-96-7 | 4025  Ed 3 |  | ML-DTL-248D  Not 1 |  |  |  |  | I  II  III |  |  |  |  |  |
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The following templates (4-8) will allow us to directly compare key ingredients.

1. **Energetic Material Template:** HMX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | HMX | | | |
| **Alternative Name(s)** | Octogen; 1,3,5,7-Tetranitro-1,3,5,7-tetraazacyclooctane | | | |
| **Formula** | C4H8N8O8 | | | |
| **CAS Number** | 2691-41-0 | | | |
| **Quality** |  | | | |
| *Type*  *Class*  *Grade*  *Include forms with improved shock response* |
| **Specification(s)** |  | | | |
| *e.g.*  *MIL-SPEC*  *STANAG* |
| **Test Data** |  | | | |
| *If possible include hazard and performance data, e.g.*  *Detonation Velocity*  *Density*  *Impact, Friction, ESD* |
| **Accredited Test Authority** |  | | | |
| **Volume/Mass** | **< 1 kg** | **1 – 10 kg** | **10 – 100 kg** | **> 100 kg** |
| *Which batch sizes can you deliver* |  |  |  |  |
| **Cost** | | | | **1 kg** |
| *Rough order of magnitude (based on an order of 100 kg)*  *[1-5 EUR; 5-10 EUR; 10-25 EUR; 25-50 EUR; +50 EUR]* | | | |  |
| **Formulations** | **Product Name** | | **Specification** | **Application** |
| *Please list here formulations that you manufacture and to which specification*  *Note the major ingredient should be HMX* |  | |  |  |
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1. **Energetic Material Template:** RDX

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| --- | --- | --- | --- | --- |
| **Name** | RDX | | | |
| **Alternative Name(s)** | Hexogen; 1,3,5-trinitro 1,3,5-tetrazacyclohexane | | | |
| **Formula** | C3H6N6O6 | | | |
| **CAS Number** | 121-82-4 | | | |
| **Quality** |  | | | |
| *Type*  *Class*  *Grade*  *Include forms with improved shock response* |
| **Specification(s)** |  | | | |
| *e.g.*  *MIL-SPEC*  *STANAG* |
| **Test Data** |  | | | |
| *If possible include hazard and performance data, e.g.*  *Detonation Velocity*  *Density*  *Impact, Friction, ESD* |
| **Accredited Test Authority** |  | | | |
| **Volume/Mass** | **< 1 kg** | **1 – 10 kg** | **10 – 100 kg** | **> 100 kg** |
| *Which batch sizes can you deliver* |  |  |  |  |
| **Cost** | | | | **1 kg** |
| *Rough order of magnitude (based on an order of 100 kg)*  *[1-5 EUR; 5-10 EUR; 10-25 EUR; 25-50 EUR; +50 EUR]* | | | |  |
| **Formulations** | **Product Name** | | **Specification** | **Application** |
| *Please list here formulations that you manufacture and to which specification*  *Note the major ingredient should be RDX* |  | |  |  |
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1. **Energetic Material Template:** PETN

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| --- | --- | --- | --- | --- |
| **Name** | PETN | | | |
| **Alternative Name(s)** | Penthrite; pentaerythritol tetranitrate | | | |
| **Formula** | C5H8N4O12 | | | |
| **CAS Number** | 78-11-5 | | | |
| **Quality** |  | | | |
| *Type*  *Class*  *Grade*  *Include forms with improved shock response* |
| **Specification(s)** |  | | | |
| *e.g.*  *MIL-SPEC*  *STANAG* |
| **Test Data** |  | | | |
| *If possible include hazard and performance data, e.g.*  *Detonation Velocity*  *Density*  *Impact, Friction, ESD* |
| **Accredited Test Authority** |  | | | |
| **Volume/Mass** | **< 1 kg** | **1 – 10 kg** | **10 – 100 kg** | **> 100 kg** |
| *Which batch sizes can you deliver* |  |  |  |  |
| **Cost** | | | | **1 kg** |
| *Rough order of magnitude (based on an order of 100 kg)*  *[1-5 EUR; 5-10 EUR; 10-25 EUR; 25-50 EUR; +50 EUR]* | | | |  |
| **Formulations** | **Product Name** | | **Specification** | **Application** |
| *Please list here formulations that you manufacture and to which specification*  *Note the major ingredient should be PETN* |  | |  |  |
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1. **Energetic Material Template:** TNT

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| **Name** | TNT | | | |
| **Alternative Name(s)** | Tolite; 2,4,6-trinitrotoluene | | | |
| **Formula** | C7H5N3O6 | | | |
| **CAS Number** | 118-96-7 | | | |
| **Quality** |  | | | |
| *Type*  *Class*  *Grade*  *Include forms with improved shock response* |
| **Specification(s)** |  | | | |
| *e.g.*  *MIL-SPEC*  *STANAG* |
| **Test Data** |  | | | |
| *If possible include hazard and performance data, e.g.*  *Detonation Velocity*  *Density*  *Impact, Friction, ESD* |
| **Accredited Test Authority** |  | | | |
| **Volume/Mass** | **< 1 kg** | **1 – 10 kg** | **10 – 100 kg** | **> 100 kg** |
| *Which batch sizes can you deliver* |  |  |  |  |
| **Cost** | | | | **1 kg** |
| *Rough order of magnitude (based on an order of 100 kg)*  *[1-5 EUR; 5-10 EUR; 10-25 EUR; 25-50 EUR; +50 EUR]* | | | |  |
| **Formulations** | **Product Name** | | **Specification** | **Application** |
| *Please list here formulations that you manufacture and to which specification*  *Note the major ingredient should be TNT* |  | |  |  |
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1. **Energetic Material Template:** Nitrocellulose

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| --- | --- | --- | --- | --- |
| **Name** | Nitrocellulose | | | |
| **Alternative Name(s)** | NC | | | |
| **Formula** | C6H8.0307N1.9693O8.9386 | | | |
| **CAS Number** | 9004-70-0 | | | |
| **Quality** |  | | | |
| *Type*  *Class*  *Grade*  *Include forms with improved shock response* |
| **Specification(s)** |  | | | |
| *e.g.*  *MIL-SPEC*  *STANAG* |
| **Test Data** |  | | | |
| *If possible include hazard and performance data, e.g.*  *Detonation Velocity*  *Density*  *Impact, Friction, ESD* |
| **Accredited Test Authority** |  | | | |
| **Volume/Mass** | **< 1 kg** | **1 – 10 kg** | **10 – 100 kg** | **> 100 kg** |
| *Which batch sizes can you deliver* |  |  |  |  |
| **Cost** | | | | **1 kg** |
| *Rough order of magnitude (based on an order of 100 kg)*  *[1-5 EUR; 5-10 EUR; 10-25 EUR; 25-50 EUR; +50 EUR]* | | | |  |
| **Formulations** | **Product Name** | | **Specification** | **Application** |
| *Please list here formulations that you manufacture and to which specification*  *Note the major ingredient should be NC* |  | |  |  |
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1. **Energetic Material Template:** Blank Please use this template to highlight materials of interest

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| --- | --- | --- | --- | --- |
| **Name** |  | | | |
| **Alternative Name(s)** |  | | | |
| **Formula** |  | | | |
| **CAS Number** |  | | | |
| **Quality** |  | | | |
| *Type*  *Class*  *Grade*  *Include forms with improved shock response* |
| **Specification(s)** |  | | | |
| *e.g.*  *MIL-SPEC*  *STANAG* |
| **Test Data** |  | | | |
| *If possible include hazard and performance data, e.g.*  *Detonation Velocity*  *Density*  *Impact, Friction, ESD* |
| **Accredited Test Authority** |  | | | |
| **Volume/Mass** | **< 1 kg/L** | **1 – 10 kg/L** | **10 – 100 kg/L** | **> 100 kg/L** |
| *Which batch sizes can you deliver* |  |  |  |  |
| **Cost** | | | | **1 kg/L** |
| *Rough order of magnitude (based on an order of 100 kg/L)*  *[1-5 EUR; 5-10 EUR; 10-25 EUR; 25-50 EUR; +50 EUR]* | | | |  |
| **Formulations** | **Product Name** | | **Specification** | **Application** |
| *Please list here formulations that you manufacture and to which specification*  *Note the major ingredient should be [\_\_\_\_\_]* |  | |  |  |
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1. **Formulations:** Please include here any new formulations that are not covered by the Explosive Template. Include details of any specification, applications and compositions

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| --- |
| **Explosive Formulations** |
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1. **Any other information:** Please use this section to inform us of any other developments, materials, technologies that you are employing that would be of interest to the community.

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| **Further information** |
|  |

1. NATO, PfP, MD, ICI, Australia, Japan, Republic of Korea, Singapore, South Africa [↑](#footnote-ref-1)