

WASC 1865

RARE Inquiry
into a Rolls fire in
Beds P705 5-4-1984

ROLLS FIRE REPORT NO 27

A Rolls fire occurred at approximately 11.00 am on Thursday 5 April 1984 in Building P705. 2 kg of LU propellant was being rolled in Bay 4 by Mr D Verrill when a pistol crack occurred followed by an ignition and a drencher operation. The sheet was being given the second pass at Gap 4 in the agreed schedule:

2 at 8; 3 at 4; 1 at 10 BF; 1 at 10 LF.

The Rolling No was R219 and the propellant LU Batch No BX 2176 was in the form of disc trims. The composition of this propellant is:

NC wood (12.2% N ₂)	49%
NG	44%
Dibutyl phthalate	1%
2-NDPA	2%
Carbon Black (Dixigloss)	0.6%
Lead β resorcyate	3%
Basic copper salicylate	2%
Candelilla Wax	0.2% maximum

The drencher operated normally and extinguished any ignition before it became a fire, there was no smell of burnt cordite and no scorch marks on the rolls.

There was no evidence of any breach of the Rules or Operating Instructions, or of any malpractice.

P D Stone
P D STONE
5 April 1984

Copies: ESO
E A Baker
P D Stone
T R Burton
A Newell
G Chapman
File

RF27



with the compliments of
MINISTRY OF DEFENCE

*From
Yvonne Allen
Registy*

MINISTRY OF DEFENCE
RARDE POWDERMILL LANE
WALTHAM ABBEY
ESSEX - EN9 1AX

SP1

~~WAC/50/01-57ET~~

ROLLS FIRE REPORT NO 26

A Rolls fire occurred at approximately 10.45 am on Monday 26 March 1984 in Building P705. 2 kg of LU propellant was being rolled in Bay 3 by Mr R Allen when a pistol crack occurred followed by an ignition and a drencher operation. The sheet was being given the second pass at Gap 4 in the agreed schedule:

2 at 8; 3 at 4; 1 at 10 BF; 1 at 10 LF.

The Rolling No was R219 and the propellant LU Batch No BX 2176 was in the form of disc trims. The composition of this propellant is:

NC wood (12.2% N ₂)	49%
NG	44%
Dibutyl phthalate	1%
2-NDPA	2%
Carbon Black (Dixigloss)	0.6%
Lead β resocylate	3%
Basic copper salicylate	2%
Candellia Wax	0.2% maximum

The drencher operated normally and extinguished the fire quickly. The rollers showed scorch marks. Most of the sheet was recovered unburnt.

There was no evidence of any breach of the Rules or Operating Instructions, or of any malpractice.

P. D. Stone

P D STONE
26 March 1984

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RF26

SP1

WAC/50/01

ROLLS FIRE REPORT NO 25

A fire occurred at approximately 10.45 am on Wednesday 19 October 1983 in Building P705. 5 lb of LU propellant was being rolled in Bay 3 by Mr J Atkins when an ignition occurred followed by a drencher operation.


The operator left the bay immediately and after the drencher had emptied of water, the propellant sheet produced copious fumes which then ignited and burnt fiercely. Mr Atkins sounded the Fire Alarm and the Senior Process Worker for the building telephoned the Fire Brigade, who quickly responded and extinguished the fire. Examination of the rolling machine and the canopy frame showed scorching indicating that the fire had been quite severe. It also showed that the canopy had worked well in directing the flames away from the roller man. There were leaves on the floor of the bay and presumably these came from above the muslin canopy, and some of these may have aided the spread of the fire. Both the rollers showed scorch marks which is consistent with the fire having been started by an ignition in the rolls nip.

The propellant was ex-Bishopton LU Batch No BX 2176, Rolling No R136 which was being given the minimum rolling to form a sheet. The schedule was 1 pass at gap 0.080 inches; 2 passes at gap 0.040 inches and 2 passes at gap 0.100 inches. The ignition occurred on the first pass at gap 0.080 inches. The propellant involved was trim from sheets that had already been through this procedure once.

The composition of LU is:

NC wood (12.2% N ₂)	49%
NG	44%
Dibutyl phthtlate	2%
Carbon Black (Dixigloss)	0.6%
Lead β resocylate	3%
Basic copper salicylate	2%
Candellia Wax	0.2% maximum

There was no evidence of any breach of the Rules or Operating Instructions. It should be noted that it is not unusual for the drencher to fail to extinguish a rolls fire (indeed its function is to protect the operator from flame while he leaves the Bay) and this is not the first time the canopy has caught fire. (See Rolls Fire Reports Nos 9 and 20. The Fire Brigade were again called out to the fire as reported in RF No 9).


P D STONE
20 Oct 1983

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E A Baker
M J Healey
P D Stone
A Newell
A Heath
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ROLLS FIRE REPORT NO 24

A drencher operation occurred at 10.36 am on Tuesday 18 October 1983 at Bay 4 of P705. The operator, Mrs L Lennard, was rolling 1 kg Small Scale mix to the agreed schedule of 30 at 4; 5 at 8; 4 at 10, she was on pass 28 at 4 when the drencher operated. Examination of the rollers showed large scorch marks on the front and back rollers, examination of the sheet showed large scorch marks at end of sheet.

The propellant was PERME No 21577 F488/3066.

NC wood	51.18%
NG	27.84%
TA	8.89%
2NDPA	2.0%
Wax	0.075%
Dixigloss	0.6%
Copper oxide	2.0%
Lead β resocylate	3.66%
Basic copper salicylate	2.0%

There was no evidence of any breach of the Rules or Operating Instructions.

A J Heath

A J HEATH
19 Oct 1983

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E A Baker
M J Healey
P D Stone
A Newell
A Heath
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RF24

E3

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ROLLS FIRE REPORT NO 23

A drencher operation occurred at 10.35 am on Thursday 7 July 1983 in Bay 3 of P705.

The operator Mr G Mortimer had finished marrying a 10 lb sheet but found a series of holes had spoiled the sheet. In accordance with the agreed practice he re-rolled the sheet at Gap 4 during which there was a series of loud bangs followed by a drencher operation. Examination of the rollers showed some scorching and the operator had seen smoke so there is no doubt that an ignition had occurred but it was promptly dealt with by the drencher.

The propellant was F488/2873, Rolling No 132 which has the nominal composition:-

NC (12.2 wood)	34.5%
NG	34.5%
2-NDPA	1.5%
WAX	0.075%
Lead Resorcylate	2.2%
Basic Copper Salicylate	1.5%
RDX	25.8%
Carbon Black	0.4%

There was no evidence of any breach of the rules or operating instructions. I shall, however, in view of this incident instruct the operators to give a Gap 10 sheet (which this was) an intermediate roll at Gap 6 prior to re-rolling at Gap 4 although since this was probable an adiabatic compression of air trapped in the holes in the finished sheet it may not help in a similar case.

It should be noted that we have now rolled over 500 Kg of F488/2873 and over 400 Kg of the other 25.8% RDX propellant F488/2871 and we have had only two drencher operations with F488/2873, including this one and none with F488/2871. Since F488/2873 is an LBR/BCS/Carbon Black propellant this must give confidence in the safety of rolling these propellants.

P D STONE
7 July 1983

- cc ESO
- Mr E A Baker
- Mr M J Healey
- Mr P D Stone
- Mr A J Heath
- File

M J Healey
20.4.83

The operators were instructed to discard the reel which caused the incident, and to continue cutting. The roles regarding the amount of propellant in the bay to be minimised, and the frequent emptying of the collection bin were emphasised. The machine to be cleared and reset before cutting recommenced.

After the incident, the cutter was examined, there was no sign of smear or build up of propellant at any point, and no evidence of any hot spots. The earth strips appeared to be in their correct positions.

This is a single base powder for the slurry cast programme, 4 reels had been cut and pressed. During the 5th reel a bright light was observed as a reflection in the casing of the machine. The operator stopped the cutter and poured water in to the collecting bin from the fire bucket. In the meantime, 222 had been dialled to summon the emergency services.

NC 12.6 Pyro	87.9
2-NDPA	1.0
Basic Copper Salicylate	5.1
Lead Beta Resorcylate	3.9
Carbon Black (Degussa)	0.3

At approximately 11.45 am on Wednesday 20 April 1983 an ignition occurred when cutting casting powder CP 2121 on cutter Melvin I in Bay 5 of P718. The nominal composition of the powder being cut is:-

INCIDENT REPORT

Handwritten marks: a red scribble and a vertical line.

SP1

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ROLLS FIRE REPORT NO 22

A drencher operation occurred at 12.15 pm on Tuesday 16 November 1982 in Bay 3 of P705. The operator, Mr J Atkins, was rolling 5 lb of trims according to the agreed shedule of 1 at 8; 4 at 4. He was rolling the first pass at Gap 8 when there was a 'pistol crack' and the drencher operated. Examination of the rollers showed a small scorch mark on the front roller. Examination of the sheet showed no scorch marks were visible

The propellant was F488/2157 from Rolling Number R121, the nominal composition is:

NC wood (12.2% N2)	53.5%
NG	35.5%
TA	6.0%
2NDPA	1.5%
Wax	0.075%
Lead phthalate	3.0%
Copper oxide	0.5%

There was no evidence of any breach of the Rules or Operating Instructions. This is now the fourth drencher operation with this composition in just over a year.

P. D Stone.

P D STONE
16 Nov 1982

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E A Baker
M J Healey
P D Stone
A Heath
File ✓

PDS16NA

EQS

SPL

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ROLLS FIRE REPORT NO 20

An incident occurred at 11.00 am Friday 30 July 1982 in Bay 3 of P705. The operator, Mr S Colgate, was rolling approximately 3 kg of a propellant sheet composition No F488/2157, rolling No R113 of which the nominal composition was:

NC (12.2% N2 wood)	53.5
NG	35.5
TA	6.0
2NDPA	1.5
Wax	0.075
Lead phthalate	3.0
Copper oxide	0.5

The propellant was being rolled according to the agreed marrying schedule of 4 passes at 4 and 2 passes at 10.

On the second pass at gap 4 a series of bangs were heard and after a delay the drencher operated. A large flame was visible prior to drencher operation which burnt the canopy screen over the rolls. The drencher extinguished the propellant although a large bang was heard after the drencher had operated. Propellant was thrown around the bay during the incident.

The rollers were being used unheated although the propellant sheet was at the usual temperature of around 50°C. Earlier bangs had been experienced and as a result it was decided to ensure that the propellant was left in the oven rather longer.

There was no evidence of any breach of the rules of the OIs.

The most worrying feature of this is the delay in operation of the drencher and the Electronics Section will check this out.

We will discontinue cold rolling of this composition and use the heated rollers.

P D STONE
30 July 1982

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E A Baker
M J Healey
A Heath
File ✓

PDS19AGA

SP1

WAC/50/01

Rolls Fire Report No 21

A fire occurred in Bay 1 of P705 at 2.35 pm on Tuesday, 3 August 1982. The operator, Mr S Colgate, was rolling a trims sheet of F488/2157 (Mix 1076) to the agreed schedule of 2 passes at 0.08" and 3 passes at 0.04". On the first pass at 0.08" the drencher operated, the staff left the building and activated the fire alarms. Later, on entering the Bay there was a noticeable smell of burnt cordite and scorch marks were found on the propellant sheet and on the rollers.

The propellant F488/2157 has the nominal composition:-

NC (12.2 Wood)	53.5
NG	35.5
TA	6.0
2-NDPA	1.5
WAX	0.075
Lead Phthalate	3.0
Copper Oxide	0.5

There was no evidence of any breach of rules or OI's.

This is the second fire with this propellant mix.

B J GARATY
3.8.1982

cc ESO
Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr A Newell
Mr A Heath
File ✓

SP1

INCIDENT REPORT · BUILDING P718 12 MAY 1982

At 4.00pm on Wednesday 12 May 1982 an ignition occurred during the cutting of Casting Powder CP 2073 on the Melvin I Cutter in Bay 5 of P718. The composition being cut was F452/811 (NCP 238).

The nominal composition is:

Nitrocellulose (12.6%N Pyro)	53.1%
Nitroglycerine	35.3%
p-NMA	0.9%
Lead β -resorcylyate	6.0%
Basic copper salicylate	2.9%
Carbon black (degussa)	1.8%
Solvent acetone/ATN alcohol 1/1:4	35.0%

The propellant was being extruded to about 13/4 mm diameter and cut to a nominal length of 1 mm.

The propellant involved was part of a 25 kg batch being pressed through a 19 hole die on the 8" Finney (high level) press. The cords were collected in trays, consisting of 19 baskets, instead of on a reel as for extrusions from the 3" press.

A number of trays had been cut before lunch without incident, but just before tea in the afternoon, the cutter began to labour and so the machine was switched off. Both the block and blades had propellant smears and when the cutter was wound back to clean the blades, propellant granules were noticed trapped behind the blades. These were all removed and the blades and block were cleaned before the cutter was reset by the Fitter. The last tray from the first pressing was then cut without further incident. The block was cleaned and the bin emptied twice during the cutting of this tray, an operation that was practised for every tray. The next tray to be cut, the first from the second cylinder, had just been extruded, but the check made on the cut before continuing showed it to be satisfactory. This was in contrast to the situation in the morning where material cut straight from the press gave tails and so had to be left to dry for 10 to 15 minutes to produce an acceptable granule. The last cord from the seventh or eight baskets had just gone through the block and the machine was being switched off when I noticed thick white fumes coming from the inspection hole of the cutter. Within a few seconds of the cutter being switched off, a large yellow flame appeared approximately 2 feet above the machine. I ran into the adjoining bay (No 6) and pulled the drencher whilst Mr T Paisley dialled 222. In the confusion, however, the Fire Services were misdirected and therefore it was some while before they arrived at the building. The fire, however, was easily extinguished by the drenchers.

Inspection of the cutter soon afterwards showed propellant smears on both the block and the cutter blades themselves. The block was slightly warm and there was a mark which could have been a

scorch mark at the end hole of the block. The plastic bristles of a brush and a sightglass, which were lying on the protective cover of the collecting bin were partly melted by the heat from the flames.

Cutting of this batch continued the following day on extrusions from the 3" press without incident, although at the end of the day propellant granules were again seen behind the cutter blades.

R G CRAIK
18 May 1982

DISTRIBUTION

DD/PERME
ESO
SGC
Dr Davies
Mr Baker
Dr Healey
Mr Stone
Mr Bourn

SP1

WAC/50/01

INCIDENT REPORT - BUILDING P714 4 MAY 1982

The incident occurred on the Velox power saw in Bay 7 of Building P714 at about 11.30 am on 4 May 1982. The Operator, Mr M Nicholson was cutting a 10 mm slice from the end of a charge approximately 50 mm diameter and 200 mm long in Composition SCDB 31. Coolant was not being used, but the automatic drencher was switched on (this was in accordance with the instructions of Mr R East on whose behalf the work was being performed) when an ignition occurred and the drencher operated. The composition of SCDB 31 is:

Nitroglycerine	17.90%
Nitrocellulose (Pyro 12.6% N ₂)	14.58%
HMX	60.00%
NIAX (Polymer)	1.80%
Triacetin	3.13%
2-NDPA	0.29%
p-NMA	0.25%
Lead β -resorcyate	0.63%
Basic copper salicylate	0.845%
Catalysts, curing agents etc	0.57%

The drencher operating was the first indication that Mr Nicholson had that an ignition had occurred. Examination of the charge after the incident showed signs of an ignition having occurred at the saw cut.

Since there is no reason why coolant should not be used on this composition I have agreed with Mr R East that we will cut the remaining charges using coolant and as an added precaution we will also switch on the automatic drencher.

P D Stone

P D STONE
5 May 1982

Copies: ESO
Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr R East
Mr A Heath
File ✓

SP1

CASTING POWDER FIRE NO 2

At 1.45pm on Tuesday 1 December 1981, an ignition occurred when cutting casting powder CP 2034 on cutter Melvin I in Bay 5 of P718. The composition being cut was F452/741.

The nominal composition is:

Nitrocellulose (Pyro 12.6% N)	53.1%
Nitroglycerine	28.6%
p-NMA	0.9%
Lead B-resorcylate	6.0%
Basic copper salicylate	2.9%
Aluminium	6.8%
Carbon Black	1.7%
Solvent - acetone/ATN alcohol 1:1.4	32%

The propellant was being extruded to about 1½ mm diameter and cut to a nominal /mm length. (ie standard casting powder dimensions). The powder was being made for a fire trial to be held later in the afternoon at the Burning Ground.

Eleven reels of propellant had been pressed before lunch, five of which had also been cut. The collecting bin had been emptied and the cutting block was cleaned before the operators went to lunch. After lunch three of the remaining reels were cut and again the bin was emptied and the cutting block cleaned. The fourth reel was then fed into the first hole on the left of the cutting block and about 10 seconds later the fifth reel was fed into the tenth hole of the block (the last hole of the group on the left hand side of the block) so that both cords were being cut on the downstroke of the cutter. As soon as this latter reel was fed into the machine the operator, Mr A Longhurst, noticed sparks to a height of ~4 ft but no smoke coming from behind the machine, although fumes had been noticed when earlier reels were being cut. He immediately broke the two cords, at which point the sparks stopped and then switched off the machine. Mr Longhurst then informed the Acting Senior Worker, Mr D Verrill, who then picked up a fire bucket and emptied its contents into the bin before informing the Foreman.

Inspection of the cutter soon after the alarm was raised revealed that the cutter block did have a propellant smear on the back, normal when cutting solvent wet cord, but that the block itself was cool. No scorch marks were visible on either the block or the cutting blades although 4 to 5 blades in succession were seen to have a slight scratch at the same position on each blade. The Melvin I is the cutter that has been used for approximately 80% of the casting powder manufacture at PERME (WA). Melvin II being used for the remaining 20%.

R G CRAIK
3 Dec 1981

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ESO
Dr D Davies
Mr E Baker
Dr M Healey
Mr P Stone
Mr P Bourne

JPI

ROLLS FIRE REPORT NO 19

An incident occurred at 10.30 am on Tuesday 1 December 1981 in Bay 10 of P705. The operator, Mr C A Smith, was rolling a 2 kg lot of F488/2802 which has the nominal composition:

NC (12.6% Pyro)	59.1%
NG	24.3%
TA	10.2%
2-NDPA	1.0%
p-NMA	0.7%
Copper oxide	3.2%
Lead salicylate	1.0%
Wax	0.075%

The propellant was being rolled to the agreed Schedule of 1 pass at Gap 2.5 and 14 passes at Gap 4 in order to produce a sheet for marrying. The propellant had undergone one pass at Gap 2.5 and had sheeted up. The operator was folding the sheet for further rolling when the drencher operated. Later examination showed no scorch marks on either the propellant sheet or on the rollers. The Electronics Section examined the drencher and concluded that there was no malfunction or accidental triggering of the system. Subsequent paste rolling showed that there was a tendency for this paste to hang up in the hopper at the rear of the machine. It seems likely that some of the paste had hung up, started to come through the rollers after the main sheet and then ignited.

There was no evidence of any breach of the Rules or OIS.

This is the second incident involving this composition and problems have occurred with the sheets sticking to the rollers. With these facts in mind it has been decided that this formulation will be abandoned.

B. J. Garaty

B J GARATY
1 Dec 1981

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Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr A Heath
File

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WAC/50/01

ROLLS FIRE REPORT NO 18

An ignition occurred in Bay 4 of Building P705 at about 13.30 Monday 30 November 1981 during the rolling of F488/2802 PERME 20658 R93.

The nominal composition is:

Pyro NC (12.6% N ₂)	59.1%
NG	24.3%
TA	10.2%
CuO	3.2%
Lead salicylate	1.0%
2-NDPA	1.7%

The operator, Miss L Mathias, was marrying a 10 lb load of sheet in accordance with the schedule 4 @ 4 BF; 2 @ 10 LF or BF. On the first pass at Gap 4 there was a series of minor pops (the familiar "fish frying" sound) followed by 3 or 4 pistol cracks of increasing loudness and the appearance of smoke and the operation of the drencher. Examination of the sheet showed some scorching and some of the sheet had burnt. Scorch marks were visible on both front and back rollers.

There was no evidence of any breach of the Rules, OI's or of any malpractice.

P D Stone

P D STONE
30 November 1981

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Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr A Heath
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ROLLS FIRE REPORT NO 17

A drencher operated in Bay 3 of P705 at 11.30 am on Monday 23 November 1981. The Operator, Mr Siebke was rolling a trim sheet of F488/2873, rolling No 90 which has the nominal composition:

NC (12.2 wood)	34.5 parts
NG	34.5 "
2-NDPA	1.5 "
Wax	0.075 "
Lead B-resorcylate	2.2 "
Basic copper salicylate	1.5 "
RDX	25.8 "
Carbon Black	0.4 "

The trim sheet was being rolled to the agreed schedule of 1 pass at Gap 8, 5 at Gap 4. On the first pass at Gap 4 there was a loud pistol crack and the drencher operated. Examination of the sheet and rollers showed no scorch marks and it seems likely that there was an ignition, but no flame.

There was no evidence of any breach of the rules or OIS.

Bernard Garaty

B J GARATY
23 Nov 1981

Copies: ESO
Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr A Heath
File

SP1

CASTING POWDER FIRE

At 11.00 on Tuesday 17 November 1981 an ignition occurred when cutting casting powder CP 2029 on cutter Melvin II in Bay 3 of P718. The composition being cut was F452/741.

The nominal composition is:

Nitrocellulose (Pyro 12.6% N)	53.1%
Nitroglycerine	28.6%
Pnma	0.9%
Lead B-resdcylate	6.0%
Basic copper Salicylate	2.9%
Aluminium	6.8%
Carbon Black	1.7%
Solvent acetone/ATN alcohol 1/1.4	36.0%

The propellant was being extruded to about 1½ mm diameter and cut to nominally 1 mm length (ie standard casting powder dimensions).

Four reels of this propellant had been pressed and cut, and the casting powder collecting bin had been emptied before the operators went to tea. During the cutting of the first reel after tea-break the cutter operator, Mr A Longhurst, noticed sparks coming from behind the machine. He saw that the casting powder in the collection bin was glowing. He immediately shouted fire and switched off the cutter.

Because of the noise caused by the use of two 3" presses it took slightly longer to raise the alarm and evacuate the building than if a fire alarm had been installed. On learning about the fire, Mr R Allen, the senior CDB worker promptly rang 222. The ambulance and (after taking a wrong turning) the fire engine arrived soon after.

Inspection of the cutter approximately ten minutes after the alarm was raised, revealed that the cutting block was cool with the inference that the ignition could not have been caused by the cutter blades rubbing against the block. The block did have a propellant smear on it, but this is normal when cutting solvent wet cord. No scorch marks were visible on either the block or the cutter blades. The Melvin II is not the usual cutter for casting powder manufacture although it has been used many times without incident. The casting powder formulation, F452/741, has been produced at PERME since 1974 and has been fully characterised at NEC as NCP 231. There was no sign of smoke prior to ignition, whereas some thin smoke has been observed with casting powders which have not ignited. There was no evidence of any breach of the Rules and QIs or of any malpractice. ESO requested a sample of the propellant which had been cut prior to the ignition and allowed cutting to continue after lunch. There was no repetition of the incident.

R. G Craik

R G CRAIK
17 Nov 1981

- Copies; Mr R Heron, DD/PERME
- Mr A T Betts ESO
- Dr D Davies
- Mr E A Baker
- Dr M J Healey
- Mr P D Stone
- File ✓

SP1

ROLLS FIRE REPORT NO 16

An ignition occurred in Bay 3 of Building P705 at about 13.30 on Thursday 22 October 1981 during the rolling of F488/2157 Rolling No 92.

The nominal composition is:

NC Wood (12.2% N ₂)	53.5%
NG	35.5%
Triacetin	6.0%
2NDPA	1.5%
Wax	0.075%
Lead phthalate	3.0%
Copper oxide	0.5%

The operator, Mr Siebke, rolled an 8 lb load of broken re-work sheet in accordance with the schedule: 2 @ 8; 3 @ 4; 1 @ 10BF; 1 @ 10 LF. On the first pass at gap 4 (with single book fold) copious yellowish-brown fumes were seen. The drencher operated normally and extinguished the fire satisfactorily.

Examination of the sheet showed some scorching and some of the sheet had burnt. Scorch marks were visible on both the front and back rollers.

Previously the rolling had given a crackling sound, although this particular rolling had been better in this respect due to the sheets being left in the ovens a little longer.

There was no evidence of any breach of the Rules and OI's.



P D STONE
22 Oct 1981

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Mr E A Baker
Dr M J Healey
Mr P D Stone
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SP1

ROLLS FIRE REPORT - No 14

An ignition occurred in Bay 3 of Building P705 at about 1345pm on Wednesday 1 April 1981 during the rolling of F488/2814 PERME No. 20741.

The nominal composition is:-

NC Wood (12.2% N ₂)	55.25%
NG	29.75%
Triacetin	8.0%
2NDPA	2.0%
Wax	0.075%
Lead Salicylate	5.0%

The operator, Mr Siebke, rolled a 1kg sheet in accordance with the agreed schedule:- 30 passes at gap 0.040"; 5 passes at gap 0.080" and 4 passes at gap 0.100". On the 16th pass at gap 0.040" a whitish flame appeared followed rapidly by operation of the drencher. The drencher operated normally and extinguished the fire almost immediately.

Examination of the sheet showed some scorching but very little of the sheet had been burnt. Two scorch marks were visible on the front roller. The operator said that the sheet was sticky when hot (as were some other similar compositions in this series) and he thought that the sheet may have stuck to the back roller and got caught in the back rollers doctor blade.

There was no evidence of any breach of the Rules and O.I's or of any malpractice.

P D STONE
1.4.81

Copies to:-
Mr A T Betts ESO
Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr B J Garaty
File ✓

SP1

ROLLS FIRE REPORT -- No 13.

On the 29th September 1980 an ignition occurred in Bay No. 10, Building P705, at about 10.30 am. The operator, Mr R Wackett, was rolling a 1 kg sheet of a single base composition F488/2789 (PERME No 20536) which has the following nominal composition:

NC (Wood, 12.2% N)	70.0%
Triacetin	23.0%
2-NDPA	2.0%
Copper Oxide (CUO)	3.0%
Lead Stannate	2.0%
Carbon black (dixigloss)	0.5%
Wax	0.075%

The rolling schedule was:

30 passes at 0.04", 5 at 0.08", 4 at 0.10".

On the 17th pass the propellant began to crackle loudly and fume. At this point the operator started to leave the bay and saw flames coming from the front of the machine before the drencher system operated. Examination of the rolls showed small scorch marks and burnt areas could be seen on the remaining propellant. A 1 kg sheet of propellant having virtually the same composition (lacking only the carbon black) had been rolled previously with little trouble.

There was no evidence of any breach of the rules and operating instructions or of any malpractice during the rolling process.

B. J. Garaty

B J GARATY
1/10/80

- Copies to:
- Mr A T Betts, ESO
 - Mr E A Baker
 - Dr M J Healey
 - Mr P D Stone
 - Mr R C Craik
 - File

SP1

ROLLS FIRE REPORT - No 12

An ignition occurred in Bay 3 of Building P705 at about 14.15 on Tuesday 29.4.80 during the rolling of F488/2592 from Mix 1008. The nominal composition is:-

NC Wood (12.2% N ₂)	57
NG	34.8
Triacetin	6.2
2NDPA	2
Lead beta resorcylate	3
Basic Cupric Salicylate	2
Carbon black (Degussa)	0.2
Wax	0.075

The operator, Miss Matthias, rolled a 10 lb married sheet in accordance with the agreed schedule:-

5 lbs paste 25 passes @0.04") Marry
5 lbs trimmings 1 @ 0.08", 4 @ 0.04"	
	4 @ 0.04"
	2 @ 0.10"

On the 4th pass at 0.04" the drencher operated. The propellant appeared to burn throughout most of the drencher operation with flames up to two feet above the rolling machine. By the end of the drencher operation the fire had been extinguished. Examination of the rolls showed scorch marks and the propellant sheet had been burnt.

There was no evidence of any breach of the Rules and O.I's or of any malpractice. The drencher had previously operated on the morning of the same day - see Rolls Fire Report No 11. Approximately 50 kg of this Mix have now been rolled and there remains about 40 kg to roll. In view of the difficulties with this propellant further rolling will be suspended whilst the position is reviewed.

Peter

P D STONE
30/4/80

- Copies to:-
- Mr A T Betts, ESO
 - Mr E A Baker
 - Dr M J Healey
 - Mr P D Stone
 - Mr R C Craik
 - Mr B J Garaty
 - Mr P J Bourn
 - Mr A J Heath

PS. It has subsequently been decided to cease rolling of this composition and to press the 50 kg of rolled up sheet into K-motors.

SP1

ROLLS FIRE REPORT - No 11

An ignition occurred in Bay 3 of Building P705 at about 9.15 am on Tuesday 29.4.80 during the rolling of F488/2592 from Mix 1008. The nominal composition is:-

NC Wood (12.2% N ₂)	57
NG	34.8
Triacetin	6.2
2NDPA	2
Lead beta resorcylate	3
Basic Cupric Salicylate	2
Carbon black (Degussa)	0.2
Wax	0.075

The operator, Mr S Colgate, rolled a 2½ lb sheet in accordance with the agreed schedule:- 2½ lb trimmings - 1 @ 0.08", 4 @ 0.04"

On the first pass at 0.04" there was a bang followed by the appearance of smoke and although the operator saw no flame the drencher operated. There were scorch marks on the rollers indicating an ignition occurring in the nip. There was no obvious evidence of burning on the sheet.

There was no evidence of any breach of the Rules and O.I's or of any malpractice. The drencher operated successfully.

This composition has a previous history of rolls fires and extra wax was added to combat this and about 50 kg has been rolled with no incidents until this drencher operation.

P D STONE
30/4/80

Copies to:- Mr A T Betts, ESO.
Mr E A Baker
Dr M J Healey
Mr P D Stone
Mr R C Craik
Mr B J Garaty
Mr P J Bourn
Mr A J Heath

SP1

ROLLS FIRE REPORT - No. 10

At 1355hrs on Monday 14 April 1980 an ignition occurred in Bay 10 of Building P705 during the rolling of F488/2754 Lot No. PERME 20352.

The nominal composition is:-

NC Wood (12.2%N ₂)	51.1%
NG	35.3%
Triacetin	8.1%
2NDPA	2.0%
Wax	0.075%
Basic Cupric Salicylate	2.0%
Lead Salicylate	1.5%

The operator, Mr S Colgate, rolled a 2¹/₂lb sheet in accordance with the agreed schedule:-

30 @ 0.04" ; 5 @ 0.08" ; 4 @ 0.10"

On the 14th pass at gap 0.04" the operator heard a loud pistol crack and flame was seen. The drencher operated normally. Flames were visible during part of the drencher operation and the bay was filled with dense yellowish fumes after the incident, and was evacuated for 15 minutes. Examination of the sheet revealed evidence of extensive burning and both rolls were badly scorched.

There was no evidence of any breach of the rules and operating instructions or of any malpractice.

Peter

P D STONE
15.4.80

- Copies to:
- Mr A T Betts ESO
 - Mr E A Baker
 - Dr M Healey
 - Mr P Stone
 - Mr R Craik
 - Mr B Garaty
 - Mr P Bourn
 - Mr A Heath
 - File ✓

SF1

WAC 50/01

ROLLS FIRE REPORT - No. 9

The incident occurred at 1.20pm on Tuesday 18 March 1980 in Bay 1 of F705 during the rolling of a 2½lb sheet of F488/2770 ERDE 20411. This is an LU type composition containing 14% of a Styrene - Butadiene Resin (SBR) Latex of the type used in Combustible Cartridge Case manufacture and with the stabiliser 2NDPA replaced by Carbamite.

The nominal composition is:-

NC Wood (12.2%N ₂)	42.2%
NG	38.0%
DBP	0.9%
Carbamite	1.75%
SBR Latex Marbon 1600 Batch 404	12.3%
Lead Beta Resorcylate	2.6%
Basic Cupric Salicylate	1.75%
Dixigloss	0.5%
Wax	0.075%

The approximate cal val of this formulation is 850 cal/g.

The SBR Latex produced a sticky sheet which stuck to the back roller and forced itself under the doctor blade on the second pass at a roll gap of 0.040 inches (rolling schedule is 30 passes at gap 0.040 inches, 5 passes at gap 0.080 inches and 4 passes at gap 0.100 inches). The rolls were stopped and most of the propellant sheet was cut off and placed in the front of the tray situated under the rollers. Part of the propellant sheet was stuck to the back roller and was also caught in the rolls nip and in order to remove it the operator, Mr G Mortimer, started the rolls and almost immediately pressed the stop bar to bring the rolls round to a position where the rest of the sheet could be removed. There was a series of bangs and the bay was evacuated. This was followed by the appearance of smoke and then flame and the drencher operated. A red glow could be seen through the water spray at the back of the rolling machine during the first half of the drencher operation. No glowing or flames could be seen during the second half of the drencher operation but at the end of it the bay was full of white smoke and fumes. The building was evacuated and from outside the building white smoke was visible coming from the

top of the roll canopy and the volume of this gradually increased over a period of about one minute. Small burning embers and smoke could be seen in the vicinity of the rolling machine during this time. The fumes around the rolling machine and in the canopy suddenly ignited with a large luminous flame. Mr Garaty then went to call the fire brigade whilst Mr Mortimer and Mr Atkins fetched the fire hose and played it on to the rolling machine from outside the building through the window. The fire was extinguished before the fire brigade arrived although the fire brigade answered the call very promptly.

The probable cause of the ignition was either friction of the hopper base on the propellant sheet which was stuck to the back roll or the adiabatic compression of an air bubble in the propellant sheet (to which soft sticky sheets are particularly prone). It seems likely that after the ignition occurred the flame was not immediately extinguished because the fire was on the back roller and so was not directly under a drencher nozzle and continued to burn during part of the drencher operation because, unusually, the rollers were not in motion and would not therefore bring the burning sheet under a drencher nozzle. After the flame was extinguished, ^{which occurred} about halfway through the drencher operation, the propellant was probably "smouldering", producing fumes but no flames until these inflammable fumes ignited along with the remainder of the propellant sheet, ^{which consisted of} the pieces previously cut off from the back roll and placed in the tray at the front of the machine (this is where the flame came from during the secondary fire).

There was no evidence of any breach of the rules and O.Is or of any malpractice.

The incident illustrates the importance of the instruction to evacuate the building and to stay out for a set period after the operation of an automatic drencher. It also illustrates the effectiveness of the canopy operation - most of the flame from the secondary fire was in a large column that went upwards into the canopy.

In future instances of propellant sticking to the back roller and the machine being stopped we should open the roll gap wide after removing as much sheet as possible, as this will minimise the risk of ignition from either of the causes postulated here. We should allow the rolls to rotate a few times to avoid the possibility of a fire being shielded from the drencher nozzles following an ignition immediately on starting the machine.

P. D. Stone

P D STONE
19.3.80

Copies: Mr L D Cole ESC
Mr E A Baker
Dr M Healey
Mr P Stone
Mr B Garaty

Mr R Goodchild FBO
Mr P Bourn
Mr A Heath
P705 Staff

SP1

ROLLS FIRE REPORT - No. 8

At 13.40 on 7th November 1979 the drencher in Bay 3 of building P705 operated during the rolling of F527/441 from Solvent Batch 7102. The nominal composition is:-

Nitrocellulose (Wood 12.2%N ₂)	21%
Nitroglycerine	21%
Picrite	55%
Carbamite	3%
Candelilla Wax	0.075%

This composition is manufactured by the semisolvent technique and contains acetone. The operator, Mr J Atkins, married a 12 lb sheet in accordance with the agreed schedule:

4 @ 8; 4 @ 6; 2 @ 10

He was rolling the last pass at gap 0.10" when the drencher operated. The last piece of the sheet was just leaving the rollers and Mr Atkins left the rolling machine with the sheet still in his hands. It has been pointed out to him that this is an unsafe practice but I think it is likely that his action was a reflex one and not a conscious decision. (When he was a few feet from the rolling machine he did in fact drop the sheet!). Mr Atkins reported that he heard a pistol crack prior to the drencher operating but neither myself nor Mr G Mortimer, the senior worker, (we were in the boot porch, about 20 feet from the rolling machine, at the time) heard this. There was no other indication of a fire having occurred. There was no evidence of any breach of the Rules and O.I.'s or of any malpractice (other than the subject already mentioned). The drencher on the rolling machine in Bay 1 had triggered three times during the course of the morning whilst in the "test" condition (as indicated by the amber light coming on) and in view of this I would conclude that the drencher operated in error on this occasion also.

There has been an abnormally high incidence of drencher operations recently, some of which were not due to an actual rolls fire. Since the implication is that there is some fault in the drencher operation, possibly due to mains induced peaks emitted by some newly installed equipment (Martindale electric turbines with thermostatically controlled electric heaters have been installed about a month ago) the electronics sections have been asked to check the drenchers out.

Peter D. Stone

P D STONE
8.11.79

Copies: Mr L D Cole, ESO
Mr E A Baker
Dr M J Healey
Mr R Craik
File ✓

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SP1

ROLLS FIRE REPORT - No 7

At 13.25 on 5th November 1979 the drencher in Bay 1 of building P705 operated during the rolling of F488/2616 ERDE 20234, a small scale batch of propellant for which the nominal composition is:-

Nitrocellulose (Wood 12.2% N ₂)	49%
Nitroglycerine	45%
Resorcinol	1.5%
2NDPA	0.5%
Candelilla wax	0.075%
Lead β Resorcylate	4.0%
Basic Copper β Resorcylate	2.0%
Carbon Black	0.7%

The operator, Mr R Wackett, rolled a 1 kg sheet in accordance with the agreed schedule:- 30 @ 0.04"; 5 @ 0.08". On the fifth pass at 0.08" the drencher operated. There had been some "squealing" on the rolls prior to the drencher operating but no pops, bangs or pistol cracks. The operator saw no smoke or flame and examination of the sheet and rolls revealed no evidence of burning nor was there any smell of burning cordite. The drencher had previously operated on the morning of the same day. This had not happened during rolling but simultaneously with the electronics being switched from "test" to "run". It was assumed that this was due to either the electronics set being in the fire condition prior to switching over or due to an electronic failure during the sensitive warming up phase of the equipment. However in view of the second drencher operation it is possible that the electronics are faulty and arrangements have been made to have a test conducted by the electronics section. There was no evidence of any breach of the Rules and O.I's or of any malpractice.

P. D. Stone

P D STONE
5.11.79

Copies: Mr L D Cole, ESO
Mr E A Baker
Dr M J Healey
Mr R Craik
File ✓

REGISTRY - FOR FILE

WAC 50/01 ^{ET}

SP1

ROLLS FIRE REPORT - No 6

At 13.40 on 25th October 1979 the drencher in Bay 3 of Building P705 operated during the rolling of F527/441 from solvent Batch 7097. The nominal composition is:-

Nitrocellulose (Wood 12.2% N ₂)	21%
Nitroglycerine	21%
Picrite	55%
Carbamite	3%
Candelilla Wax	0.075%

This composition is manufactured by the semi-solvent technique and contains acetone. The operator, Mr J Atkins, married a 12 lb sheet in accordance with the agreed schedule

6 lb lots 4 @ 8, 4 @ 6, 2 @ 10)
6 lb lots 8 @ 8, 6 @ 6, 2 @ 8, 2 @ 10 } 4 @ 8, 4 @ 6, 2 @ 10

He was rolling the last pass at gap 0.10" when the drencher operated. There was no smoke or flame, no pistol cracks, no scorched or burnt sheet, and no indication of any sort of an ignition. There was no evidence of any breach of the Rules and O.I's or of any malpractice and it is assumed that the drencher operated in error.

Peter

P D STONE
26/10/79

Copies: Mr L D Cole, ESO
Mr E A Baker
Dr M J Healey
Mr R Craik
File

SP1

ROLLS FIRE REPORT - No 5

An ignition occurred in Bay 3 of Building P705 at about 10.35 am on Wednesday 17.10.79 during rolling of F488/2592 from Mix 1008. The nominal composition is:-

NC Wood (12.2% N ₂)	57
NG	34.8
Triacetin	6.2
2NDPA	2
Lead beta resorcylate	3
Basic Cupric Salicylate	2
Carbon black (Degussa)	0.2
Wax	0.075

The operator, Mr G Mortimer, rolled a 2½ lb sheet in accordance with the agreed schedule:-

2½ lb trimmings - 1 @ 0.03", 4 @ 0.04"

On the 4th pass at 0.04" the operator heard a series of pops and bangs. The drencher operated immediately and the operator saw no flame and saw smoke only after the drencher had operated. Examination of the sheet revealed evidence of burning and there were extensive scorch marks on both rolls.

There was no evidence of any breach of the Rules and O.I's or of any malpractice.

The drencher (which had previously fired on 4.10.79) had clearly operated successfully.

Three ignitions with Mix 1008 were reported earlier, see in particular Mr Baker's note of the fire which occurred on 4.10.79.

P. D. Stone.

P D STONE
19.10.79

File ES
WAC 50/01

SP 1

ROLLS FIRE REPORT

An ignition occurred in Bay 3 of building P705 at about 11.00 am on Thursday 4.10.79 during rolling of F488/2592 from Mix 1008. The nominal composition is:-

NC Wood (12.2% N ₂)	57
NG	34.8
triacetin	6.2
NDPA	2
lead beta resorcyate	3
basic cupric salicylate	2
carbon black (Degussa)	0.2
wax	0.075

The operator, Mr G Mortimer, rolled a 10 lb married sheet in accordance with the agreed schedule:-

5 lbs paste	25 passes @ 0.04"	} marry 4 @ 0.04" 2 @ 0.10"
5 lbs trimmings	1 @ 0.08, 4 @ 0.10 0.040"	

On the third pass at 0.04" the operator heard a pistol-crack. The drencher operated immediately and the operator saw no flame or smoke. Examination of the sheet revealed a small, roughly diamond shaped, hole about 6 sq. inches in size, some 3 inches from the right hand edge and within 6 inches of the tail. There was evidence in the surface appearance and smell that burning had taken place around the edges of the hole and matching scorch marks on both rolls suggested that some of the hole itself resulted from propellant burning away.

There was no evidence of any breach of the Rules and O.I's or of any malpractice. The drencher (fully tested only two days earlier) had clearly operated successfully. The operator reported that the propellant sheet and rolls surfaces appeared to get quite hot during rolling (the rolls surfaces were within the range 50°C ± 1°C some 15 mins after the incident). He also confirmed that pistol cracks had occurred during rolling of paste sheets.

Two ignitions on 6.4.79 with paste from mix 1008 were reported earlier. Records for Small Scale lots of F488/2592 and closely related compositions frequently refer to screaming and pistol cracks at rolling. In view of this record and also evidence of large ballistic variability in F488/2592 consideration will be given to scrapping the remainder of the mix. [The formulation was devised to meet the requirement for Milan Driver disc - now abandoned]. It is also recommended that future formulations of this type - BCS/LBR/carbon black - should contain 0.2 parts candelilla wax.

E A BAKER
4.10.79

Copies: Mr L D Cole, ESO
Dr M Healey
Mr P Stone
Mr R Craik
✓ File

MR E A BAKER

ROLLS FIRES

We discussed Peter Stone's reports of the two rolls fires on 6 April - both involving composition F488/2592.

Although this is a new composition you assured me it is not an energetic material or includes any new ingredients other than a new grade of carbon black.

Since some odd shaped sheet was being reworked I have little doubt that the fires have an adiabatic origin. You agreed to keep me informed of any further problems or findings that might shed more light on the incidents.

Although the drencher did not operate on the first incident I was pleased that it was the non appearance of flame and not a malfunction of the equipment.



L D COLE

Establishment Safety Officer(WA)

11 April 1979

Copies to:- SP1

Mr P D Stone

File ✓

P1

ROLLS FIRE REPORT - No 3

There had been an incident on the previous rolling operation reported in Rolls Fire Report No 2. The finishing of the remains of the sheet from this incident had produced loud squealing.

The next trims sheets to be rolled up were rather cold - about 40°C - and cracked on the rolls (the sheet is very brittle when cold). They were fed separately and married at the ends only on the first pass which was at gap of 0.080 inches. The second pass was at a gap of 0.040 inches and there was a series of loud cracks culminating in smoke appearing above the rolls. The operator Mr S Colgate saw flame beneath the rolls. The drencher operated normally. The incident occurred on the rolling machine in Bay 3 at 2.00 pm on Friday 6.4.79. Examination of the sheet showed no evidence of grit and no obvious signs of having been burnt. There was only a slight scorch mark on the front roll which may have arisen from the previous incident.

There was no evidence of any breach of the Rules and Operating Instructions or of any malpractice. The sheet will be sent to the burning ground. The propellant was a large scale Mix 1008, composition F488/2592. No damage or injury occurred.

P D STONE
9/4/79

ESO

Copies: Mr E A Baker
Dr D G Davies
Mr P D Stone
Mr R Craik
File

SP 1

ROLLS FIRE REPORT - No 2

The fire occurred on the 1st pass at a gap of 0.080 inches during rolling of trims on the rolling machine in Bay 3 at 11.00 am on Friday 6.4.79. The operator, Mr J Chance, heard a loud report, noticed smoke but saw no flame. He then withdrew rapidly. The drencher did not operate.

Examination of the sheet showed no evidence of grit. There was no evidence of any breach of the Rules & Operating Instructions or of any malpractice. The rolling will be finished on the unscorched sheet and it will be used. The propellant was a large scale Mix 1008, composition F488/2592. The propellant sheet showed signs of scorching and both rolls were extensively scorched in positions which would indicate that the ignition occurred in the centre of the roll nip.

Although the drencher did not operate the photoelectric cells were tested before starting work on the morning of the 6.4.79 and also after the incident and were found to be functioning normally. The solenoid head of the drencher was previously tested on 29.3.79 and was tested after the incident and found to operate normally. No damage or injury occurred.

P D STONE
9/4/79

Copies: ESO
Mr E A Baker
Dr D Davies
Mr P D Stone
Mr R Craik
File

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SP1

ROLLS FIRE REPORT

The fire occurred on the 9th pass at a gap of 0.040 inches on the rolling machine in Bay 1 at 11.10 am on Monday 27.11.78. The operator, Mr John Atkins, noticed smoke in the area of the sheet when most of it had passed through the rolls. He rapidly withdrew and the drencher operated shortly afterwards. The operator did not hear a pistol crack. Examination of the sheet showed no evidence of grit. There was no evidence of any breach of the Rules and Operating Instructions or of any malpractice. The unburned sheet will be sent to the burning ground. The propellant was a 1 kg small scale lot ERDE 19606, composition was F488/1827(LU). The propellant sheet showed signs of burning and both rolls were extensively scorched.

Although there is an indication that the operation of the drencher was delayed (ie the appearance of smoke some time before) no damage or injury occurred and otherwise the drencher operated normally.

P. D. Stone

P D STONE
27.11.78

- Copies: ESO
 Mr E A Baker
 Dr D Davies
 Mr P D Stone
 Mr R Craik
 File

From

Date

Tel

Your ref

Our ref

Subject

Registry,
please could
you place these in a
temporary jacket until
WAC 50/01 turns up,

thank you

Peter Stone

18-10-79.