Weco Hammer Unions

Mismatched Unions have caused fatal accidents!

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Presentation Objective

Discuss the "3" hazards of the FMC "Weco" Hammer Union"

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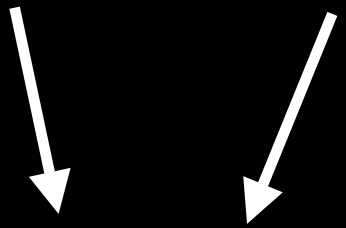
What are "Weco Hammer Unions"?

- They are connectors for temporary pipe & flow line installations
- FMC acquired the original Weco company in the 1950's
  - The design is old, and manufactured by many companies
  - Used in steel & chemical plants, dredging vessels, strip mines & in the oil industry
- More than a dozen design variations
  - Designated by nominal pipe & a 'Fig' number



2" 1502

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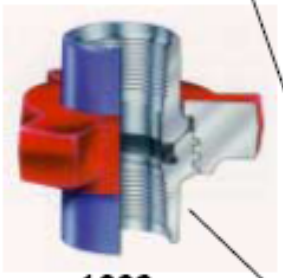
The First Hazard

A 2" 1502 Wing Nut will make up to a 2" 602 or 1002 thread half but will fail … explosively.

602



1002

1502

Series (Figure)	Standard Working Pressure	Nominal Pipe Sizes (dia - inches)
100	1,000	2, 2½, 3, 4, 6, 8
200	2,000	1, 1¼, 1½, 2, 2½, 3, 4
206	2,000	1, 1¼, 1½, 2, 2½, 3, 4, 6, 8, 10
207	2,000	3, 4, 6, 8, 10
211	2,000	1, 1¼, 1½, 2, 2½, 3, 4
400	2,500	5, 6, 8, 10, 12
400	4,000	2, 2½, 3, 4
600	6,000	1, 1½, 2, 2½, 3, 4
602	6,000	1, 1¼, 1½, 2, 2½, 3, 4
1002	10,000	1, 1¼, 1½, 2, 2½, 3, 4, 5, 6
1003	10,000	2, 3, 4, 5
1502	*15,000*	1, 1½, 2, 2½, 3, 4
2002	20,000	2,3
2202	15,000	2, 2½, 3

Potentially Fatal Combinations

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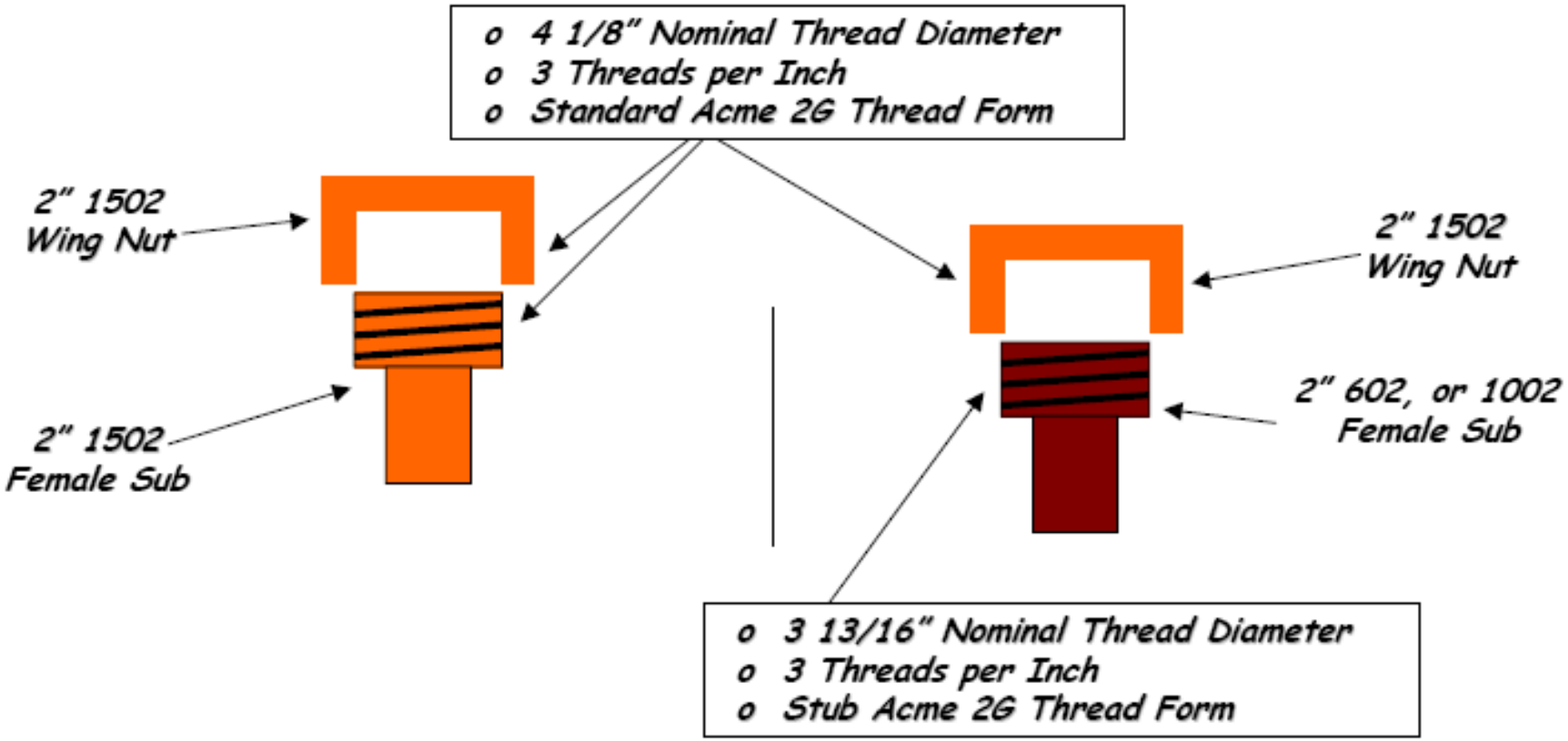
The First Hazard

A 2" 1502 Wing Nut will make up to a 2" 602 or 1002 thread half and will hold some pressure ! However … … it will fail explosively.



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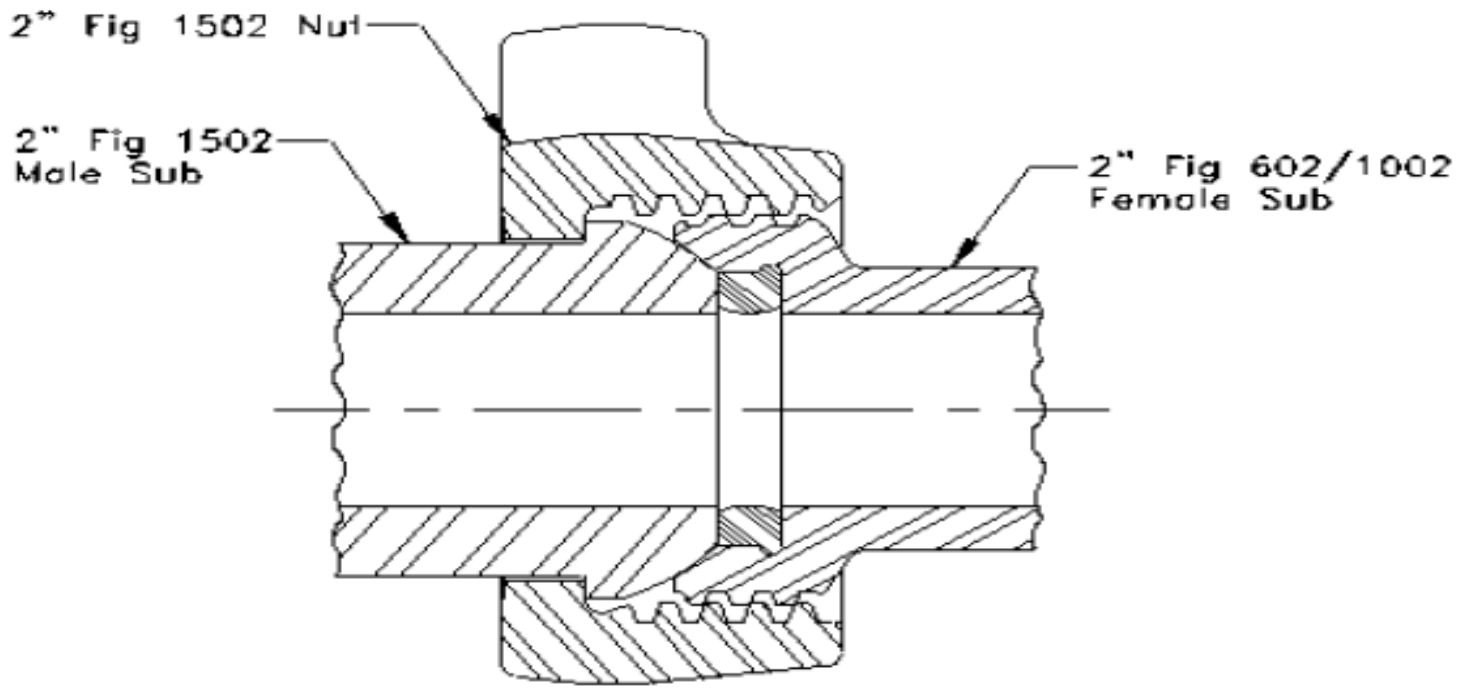
Wrong!



Incorrect Combination

2" 602 Thread Half (Female Sub) with 2" 1502 Wing Nut (Male Sub)

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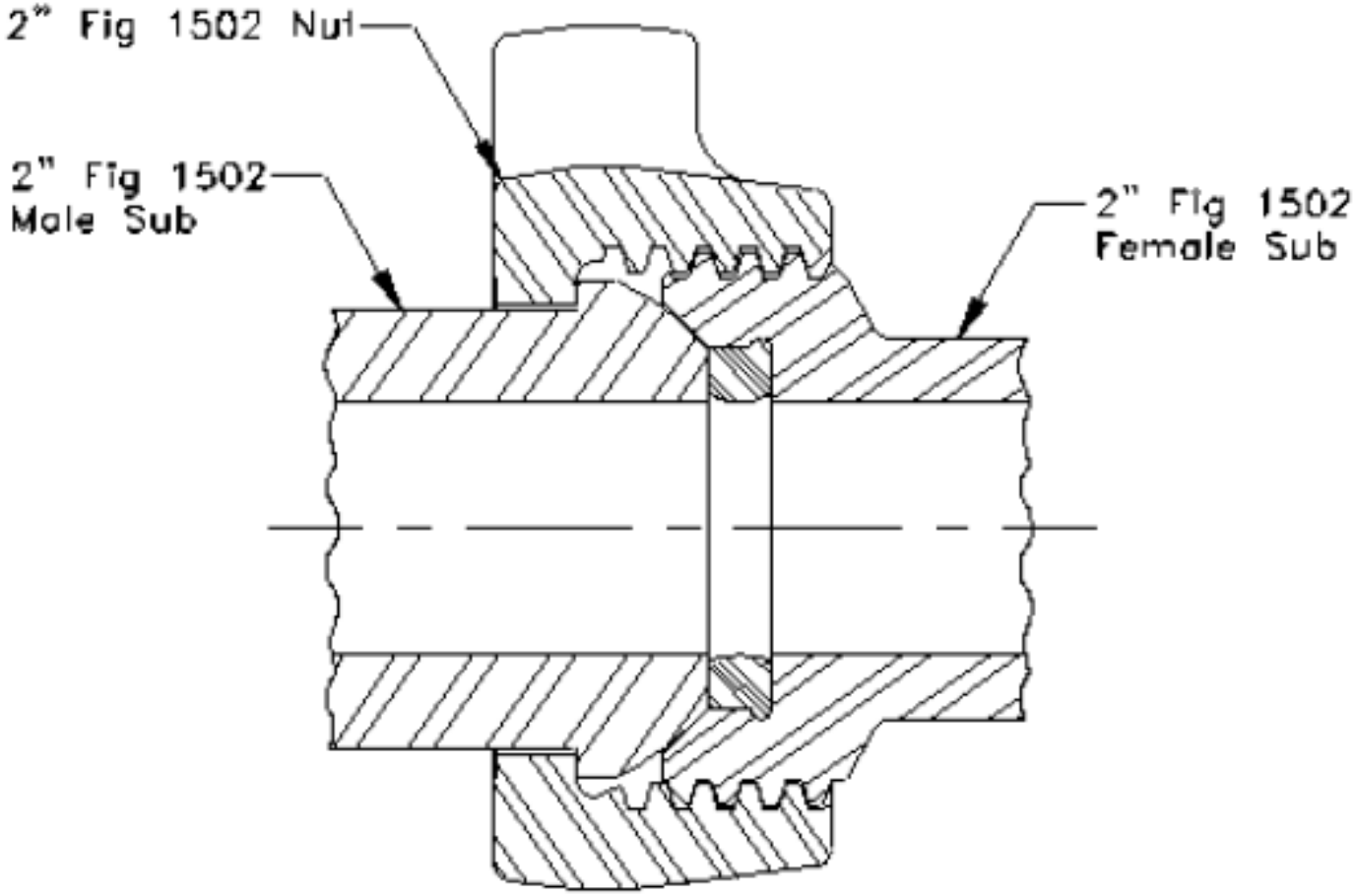
Right!



Correct Combination

2" 1502 on Both Sides

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Hammer Union Combinations

2″ Thread	2″ Wing	Result
602	602	Rated to 6,000 psi
1002	1002	Rated to 10,000 psi
1502	1502	Rated to 15,000 psi
602	1002	Holds 6,000 psi, Not Recommended
1002	602	Holds 6,000 psi, Not Recommended
602	1502	Fails at ~2,000 psi
1002	1502	Fails at ~2,000 psi
1502	602	Won't screw together
1502	1002	Won't screw together

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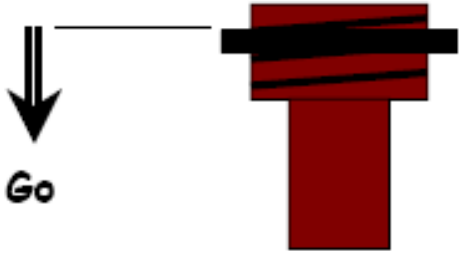
Prevention

When there is uncertainty …
(Connecting to other companies equipment)

Use the Go No-Go Gage to be sure you have a 1502 Thread Half (Female Sub)

FMC P/N
P511389

2" 1502



2" 602/1002

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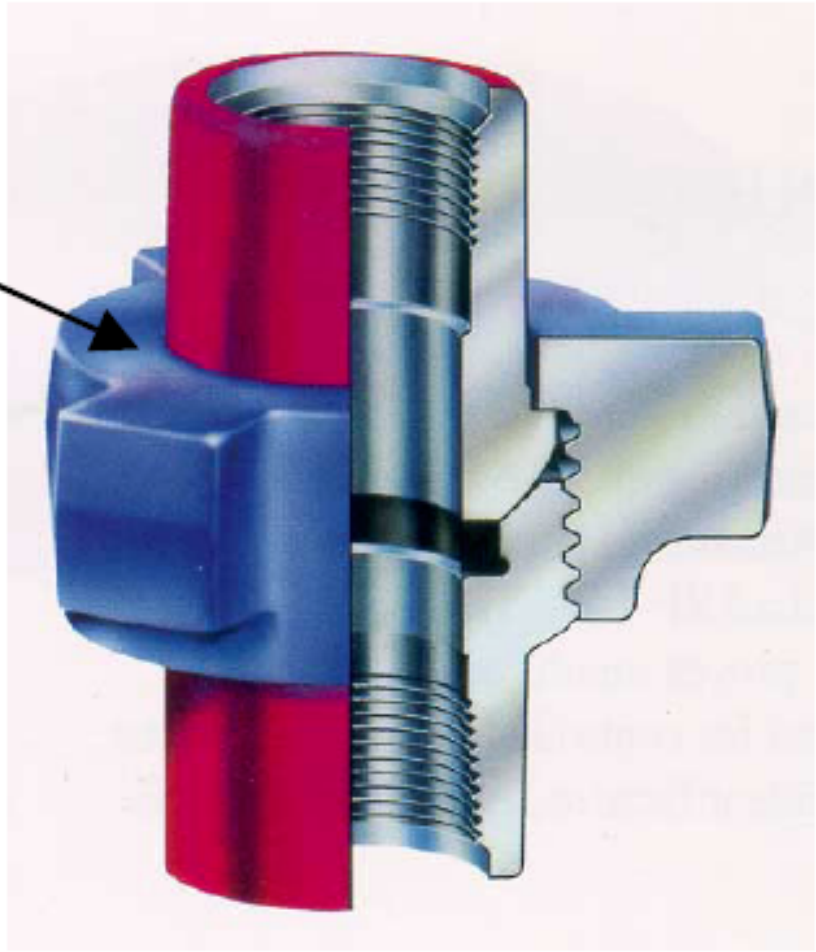
Prevention

Find the Identification Markings (2" 1502) on the Wing Nut ... Here



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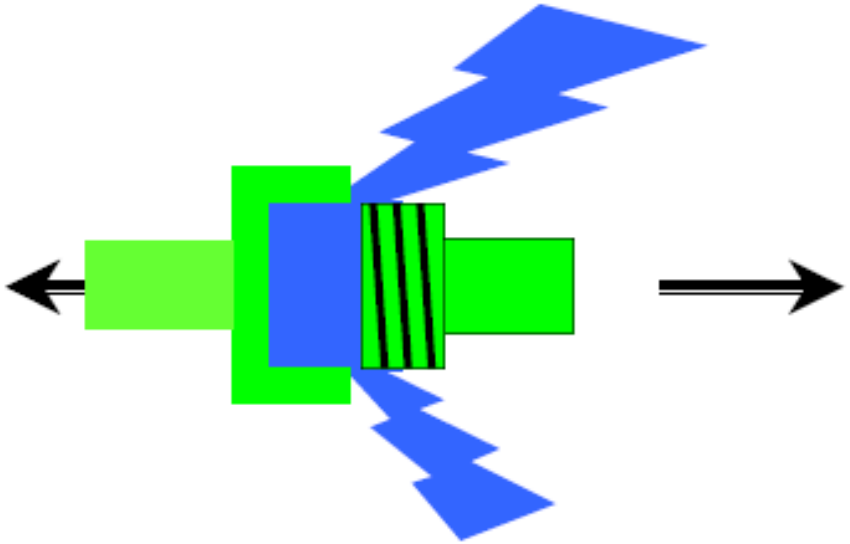
The Second Hazard

Off brand unions may not hold rated pressure.



Use only Unions supplied by FMC and in good condition.

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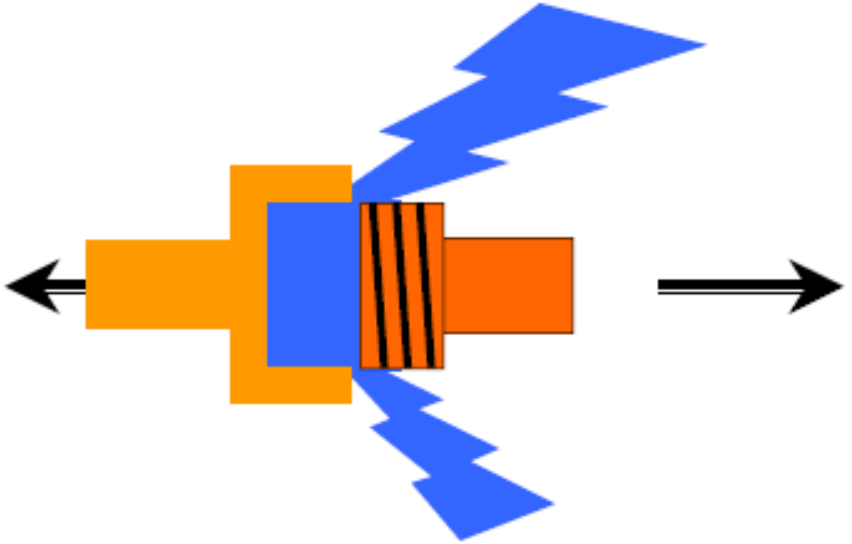
The Third Hazard

Like 1002 and 602 Unions, a Guiberson thread half will make up to a 1502 wing nut, but will fail explosively.



Use only Unions supplied by FMC and in good condition.

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Incidents & Near Misses

- What can we learn from the past?

  - **1995** – Fatality on H&P rig due to 1502/602 mismatch on standpipe.
  - **1995** – Near miss on H&P rig due to 1502/602 mismatch on fill up line while running casing.
  - **1996** – Incident due to 1502/602 mismatch on tubing head during coiled tubing cleanout.
  - **1998** – Near miss on Nabors rig due to 1502/602 mismatch on standpipe.
  - **1999** – Near miss on annular injection unit due to 1502/602 mismatch on wellhead.

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IADC Safety Alert – Fatal Accident

Safety Alert

ALERT 98-1

High Pressure Lines and Hammer Unions

A drill crew was drilling ahead when a third party pressure sensor attached to the stand pipe stopped working. The sensor was made up to the standpipe with a size "602" hammer union rated at 6,000 psi working pressure. The crew removed the faulty sensor and replaced it. The hammer union on the new pressure sensor had a size "1502" wing nut rated to 15,000 psi. The "1502" female threads in the wing nut appeared completely made up to the "602" male threads coming off the standpipe.

The mud pumps were engaged and drilling operations resumed. As the mud pump pressure increased, no leaks were detected. Then, at approximately 2,000 psi, the pressure sensor and "1502" wing nut were blown off the standpipe. Fortunately, no one was struck by the projectile or the ensuing stream of drilling fluid. Approximately one barrel of oil-based mud was sprayed on the rig floor before the mud pumps were secured and the standpipe was isolated.

The mishap was considered an environmental incident and a significant near miss, which could have resulted in serious injury or death.

After investigating the incident, operator offered the following suggestions:

1. Only unions with like threads should be made up. Although mismatched threads may appear made up (as they did in this case), only a portion of the threads are engaged and the union will fail under pressure.
2. Both halves of the union should have the same pressure rating.
3. All pressure lines should be inspected to ensure there are no mismatched unions.

This material is presented for information purposes only. Managers & supervisors should evaluate this information to determine if it can be applied to their own situations and practices. From : http://iadc.org/alerts/sa98-1.htm

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Fatal Incident at Well Site

What Happened?

At 1345 hrs on 11/30/2005, the Injured Party [IP], while operating a sand filter valve in a temporary well test setup, sustained severe multiple injuries caused by the impact from a female hammer union, which failed under pressure during the well test. He was thrown 19 feet from the sand filter to impact against a cutting box.

He was transported by a medical helicopter to a regional clinic where underwent emergency surgery. He later died in the clinic!

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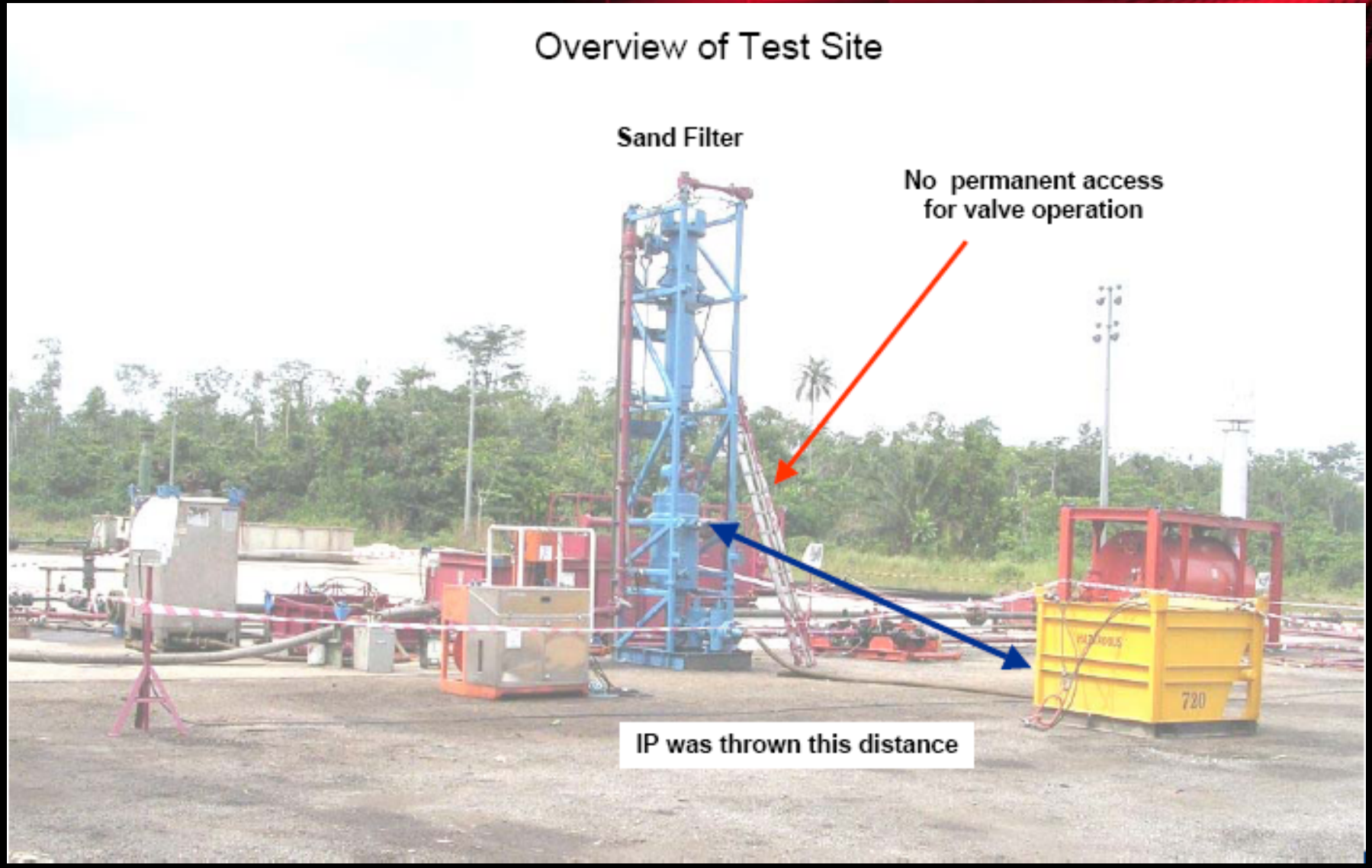
Overview of Test Site



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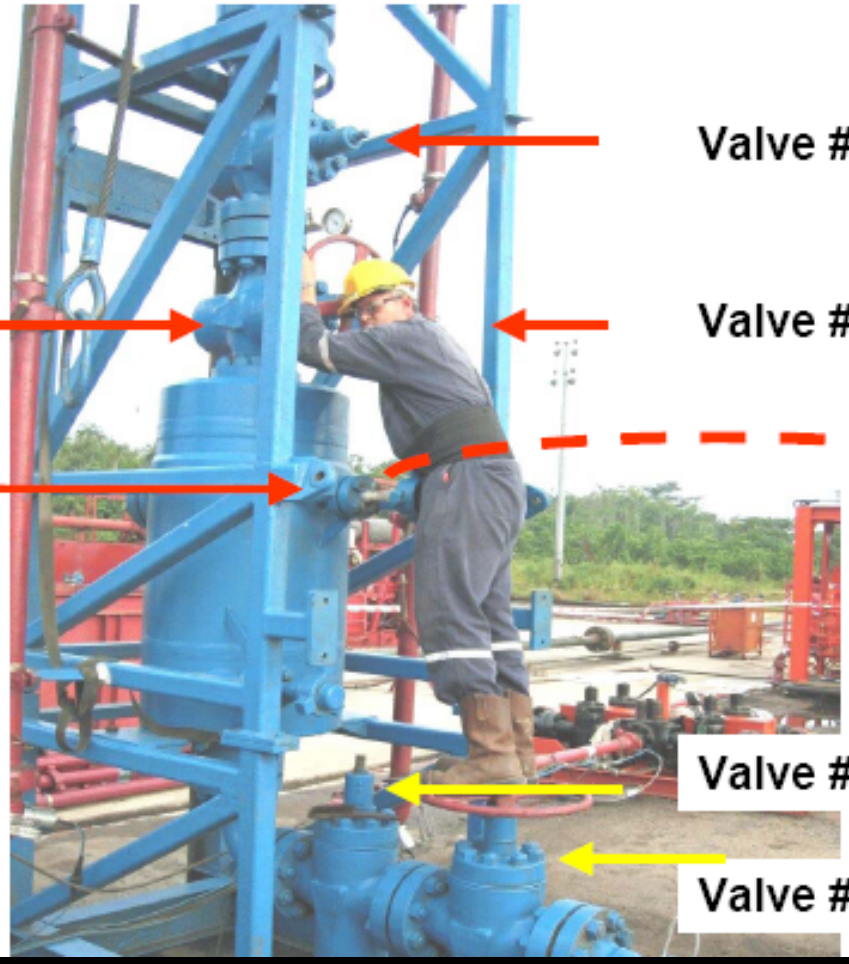
Position of IP at time of incident (re-enacted)



Stripped Out Female Sub

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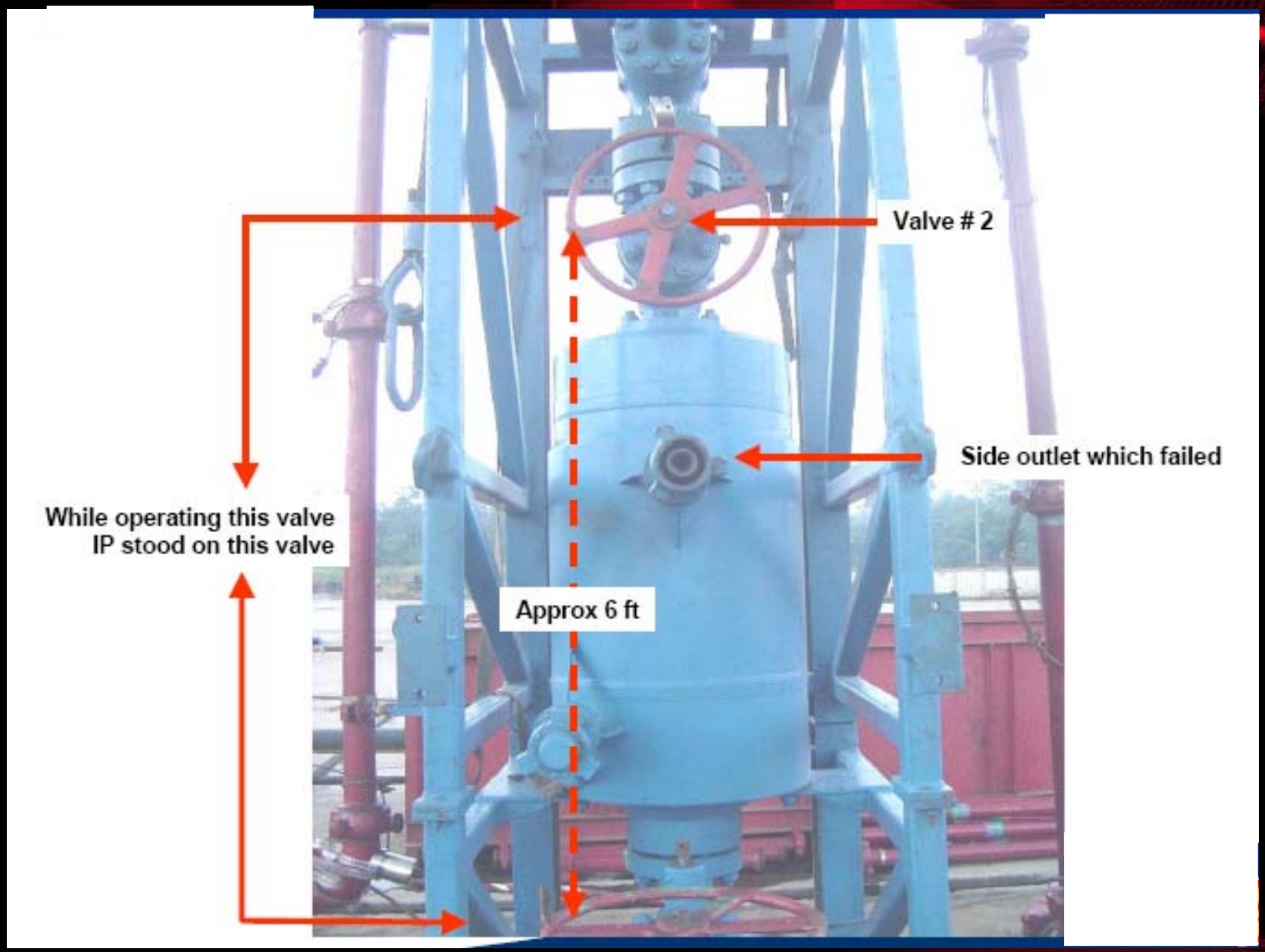

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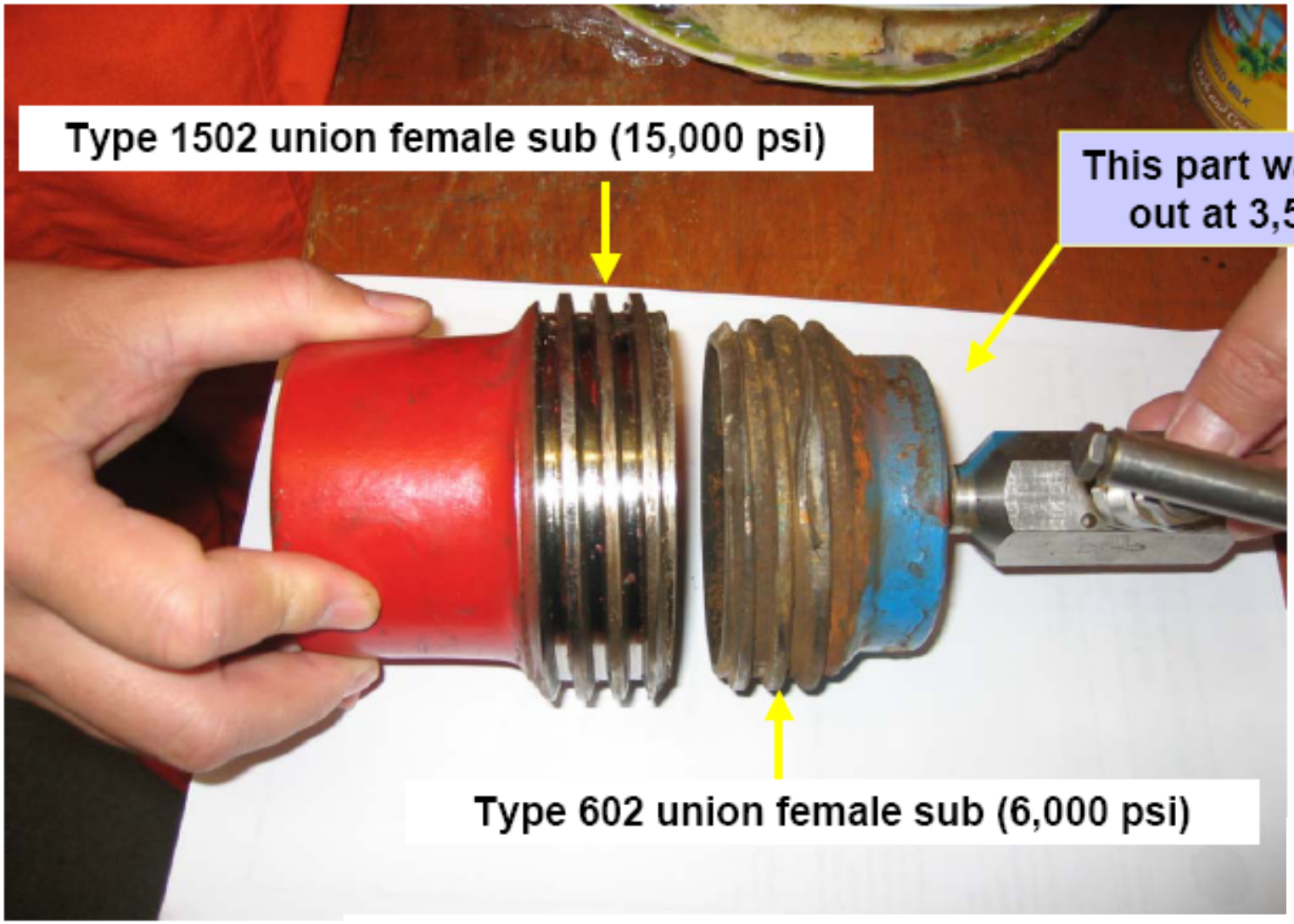
Differences in union female subs



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Can you see the difference?

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New 1502 versus failed 602

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Summary

- **"The 3 Hazards"**
  1. **2" 1502 Wing Half will attach to a 2" 602 or 1002 Thread Half and hold *limited* pressure, but will fail *explosively.***
  2. **Non OEM or Off brands may not hold rated pressure.**
  3. **Incompatibility of FMC 2" 1502 Wing Half and 2"Guiberson thread half.**

- **Prevention**
  - **Use only 2" 1502 unions by FMC, in good condition**
  - **Check before you connect:**
    - **Use the Go / No-Go Gauge to insure a 2" 1502 thread half.**
    - **Look for 2" 1502 on the Wing Half**

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