

# NexGen Burnthrough Test Apparatus

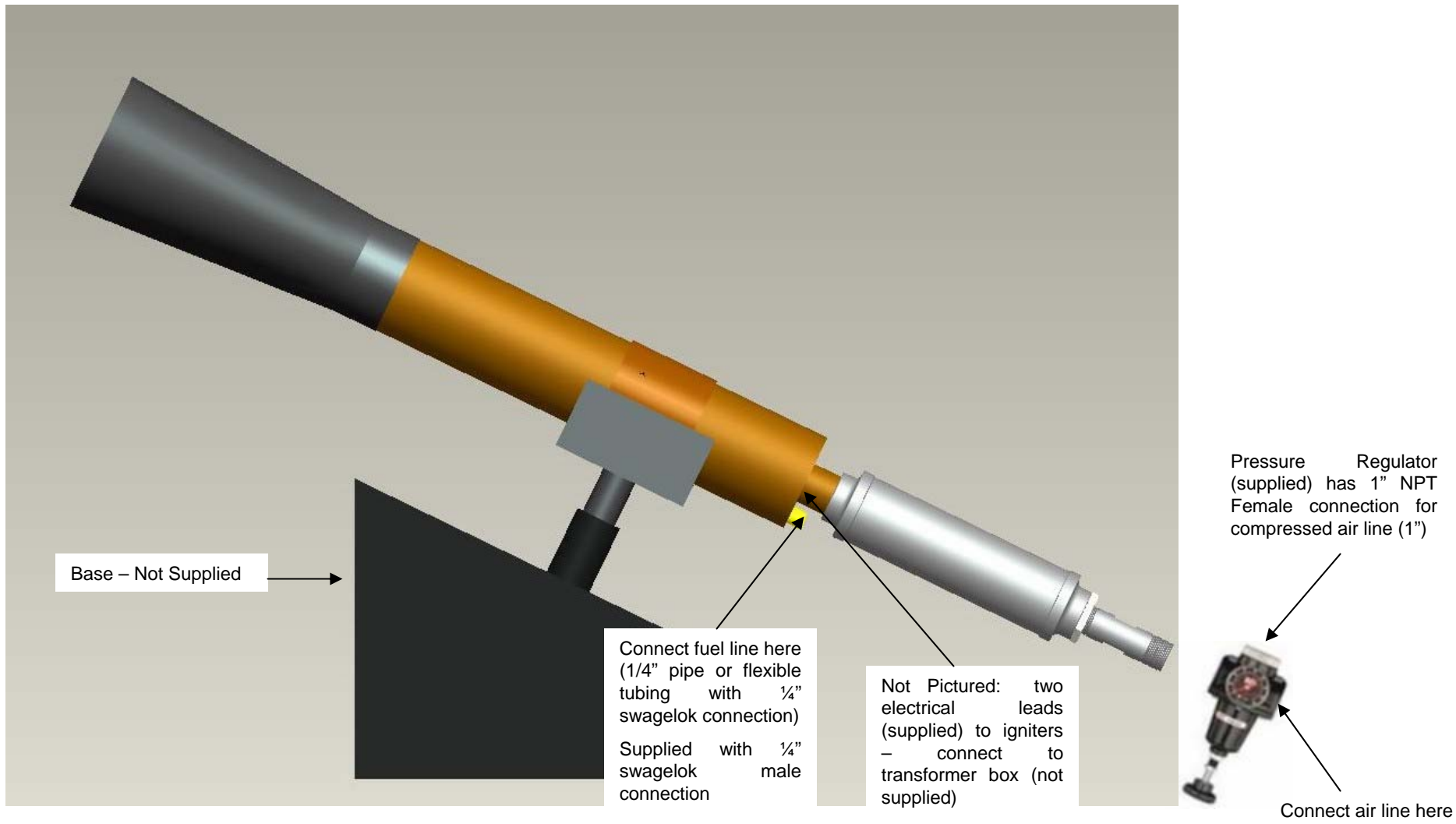
## Laboratory Setup Guidelines



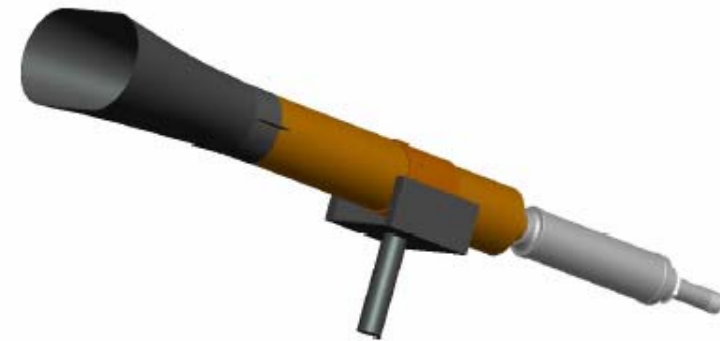
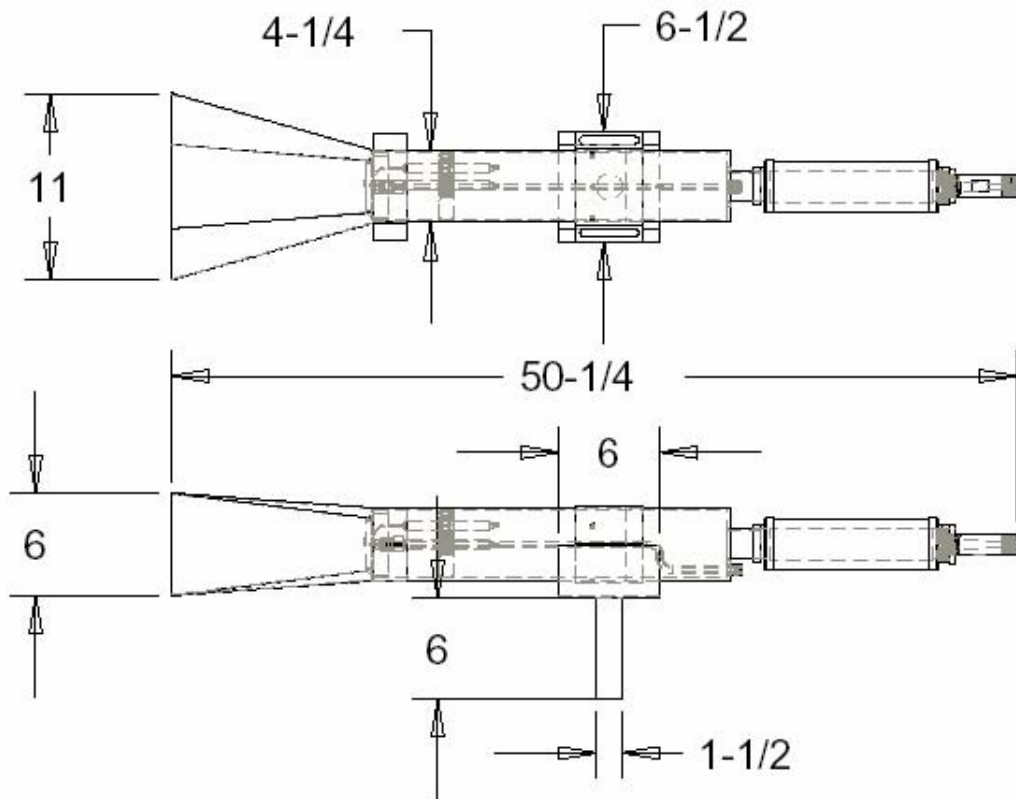
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# System Schematic



**\*\*Dimensions  
are in inches\*\***

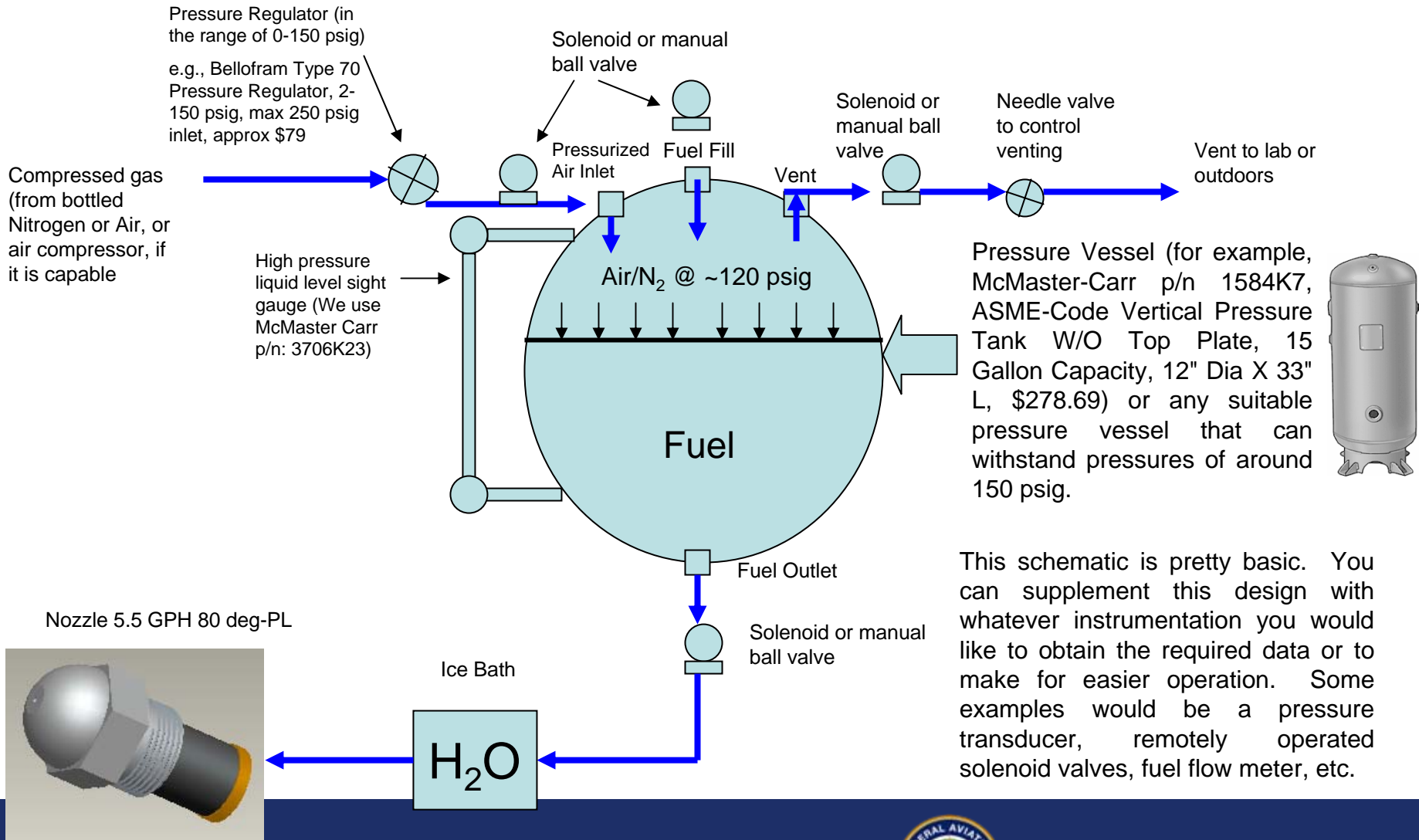


# Compressed Air Supply

- **Compressor minimum requirements:**
  - Constant line pressure of at least 57-60 psig
  - Mass flow rate of 63 SCFM (standard cubic feet per minute)
  - Burner comes supplied with a pressure regulator upstream of the sonic orifice. To connect the burner to your compressed air supply, a 1” air line will be required
- **Regulator has 1” NPT female connection. A flexible air line will make connections easier, we use a steel braided 1” flex-line.**
- **Before receiving the burner, it may be wise to measure the temperature of your airflow as a function of time while your compressor is running, for a time duration about equal to that of a burnthrough test. This will tell you if you will have fluctuations in air temperature during a test. The temperature should be approx 50-60 deg. F. It is recommended to install an in-line water cooled heat exchanger to dampen out temperature fluctuations. We use McMaster Carr p/n 43865K78 ([www.mcmaster.com](http://www.mcmaster.com)) with a condensate separator, McMaster Carr p/n 43775K55**



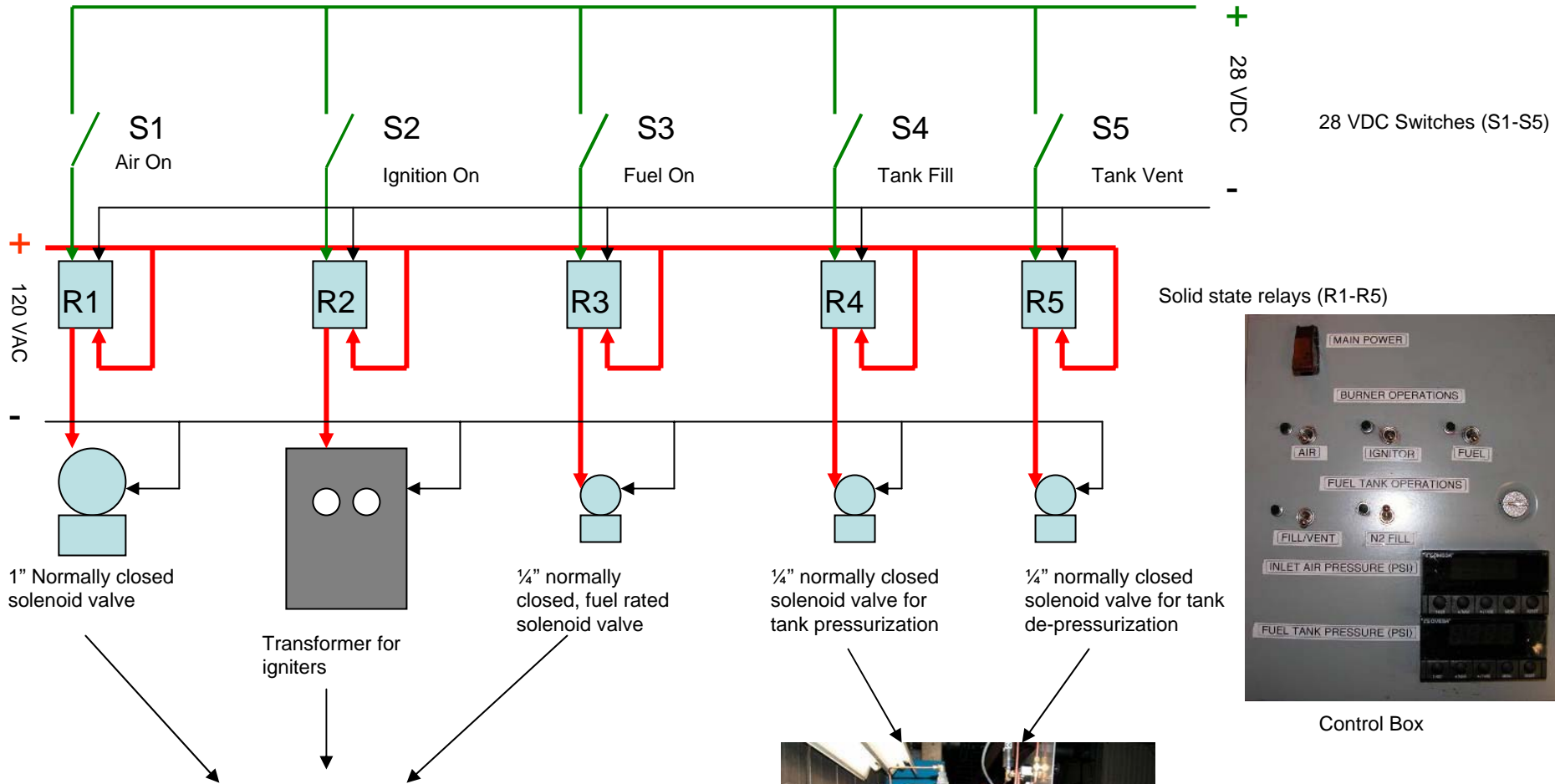
# Pressurized Fuel System



This schematic is pretty basic. You can supplement this design with whatever instrumentation you would like to obtain the required data or to make for easier operation. Some examples would be a pressure transducer, remotely operated solenoid valves, fuel flow meter, etc.



# Controls



# Photographs of FAATC NexGen Burner Setup



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# Burner Setup Checklist

- **Fuel Temperature**

- Fuel temperature must be measured at the back of the burner, as indicated on slide 3
- A 1/8" sheathed type-K thermocouple inserted into a 1/4" Swagelok t-connection should be inserted into the fuel line as indicated on slide 3
- The liquid fuel should be cooled in an ice bath, as shown on slide 4. This can be achieved by using a tub or bucket filled with an ice-water mixture. Fuel run through copper tubing coils will cool to approximately 32-40°F by the time it reaches the fuel thermocouple. The length of the coils in the bath at the tech center is approximately 37 feet (the length of the coils will vary depending on where the ice bath is located)
- The initial temperature of the fuel should be around 32-40°F. During the length of a test, the fuel temperature increase should not be greater than 10°F (the maximum increase seen at the tech center was around 5°F).
- Insulation should be used to cover the ice bath, fuel, and air lines to prevent heating of the fuel or air by flame radiation. See slide 5.

- **Fuel Pressure**

- Fuel pressure is to be measured in the same manner as temperature, as indicated on slide 3.

- **Air Temperature**

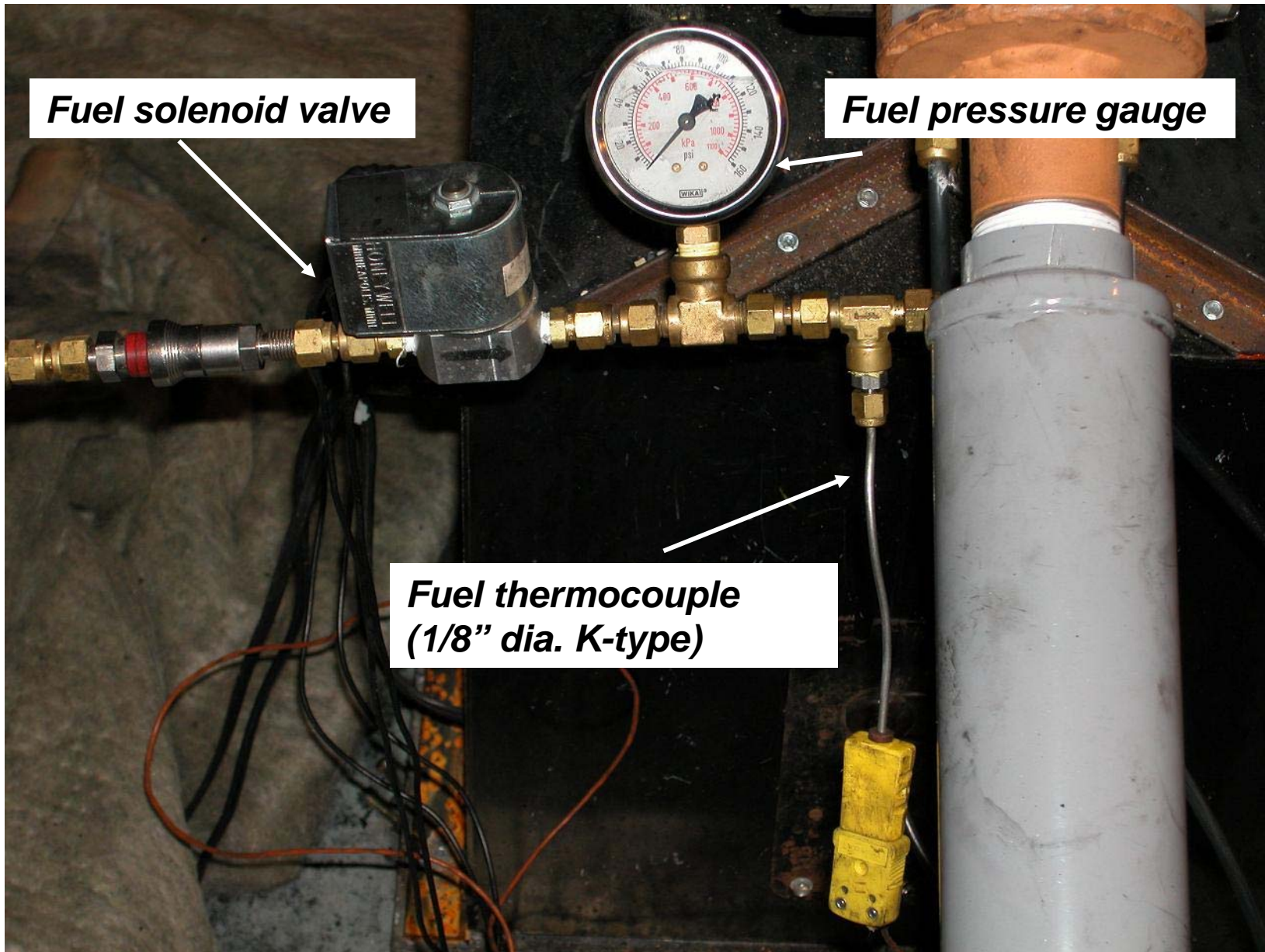
- To regulate the air temperature, an in-line water cooled heat exchanger can be used to dampen out fluctuations in air temperature. McMaster-Carr p/n 43865K78 and 43775K55 is used at the tech center. This device keeps the change in air temperature down to approximately 5°F, with an initial temperature of approximately 50-60°F (depending on the water temperature).
- An ice bath can be used to chill the water used as the heat exchange medium for the heat exchanger. This will expedite the cooling process, and will also help to maintain a very steady air temperature.

- **Cone**

- The top side of the cone is marked with three hash marks to align the cone with the draft tube (slide 7). Use these marks as a guide, but not to replace proper measurement and orientation.



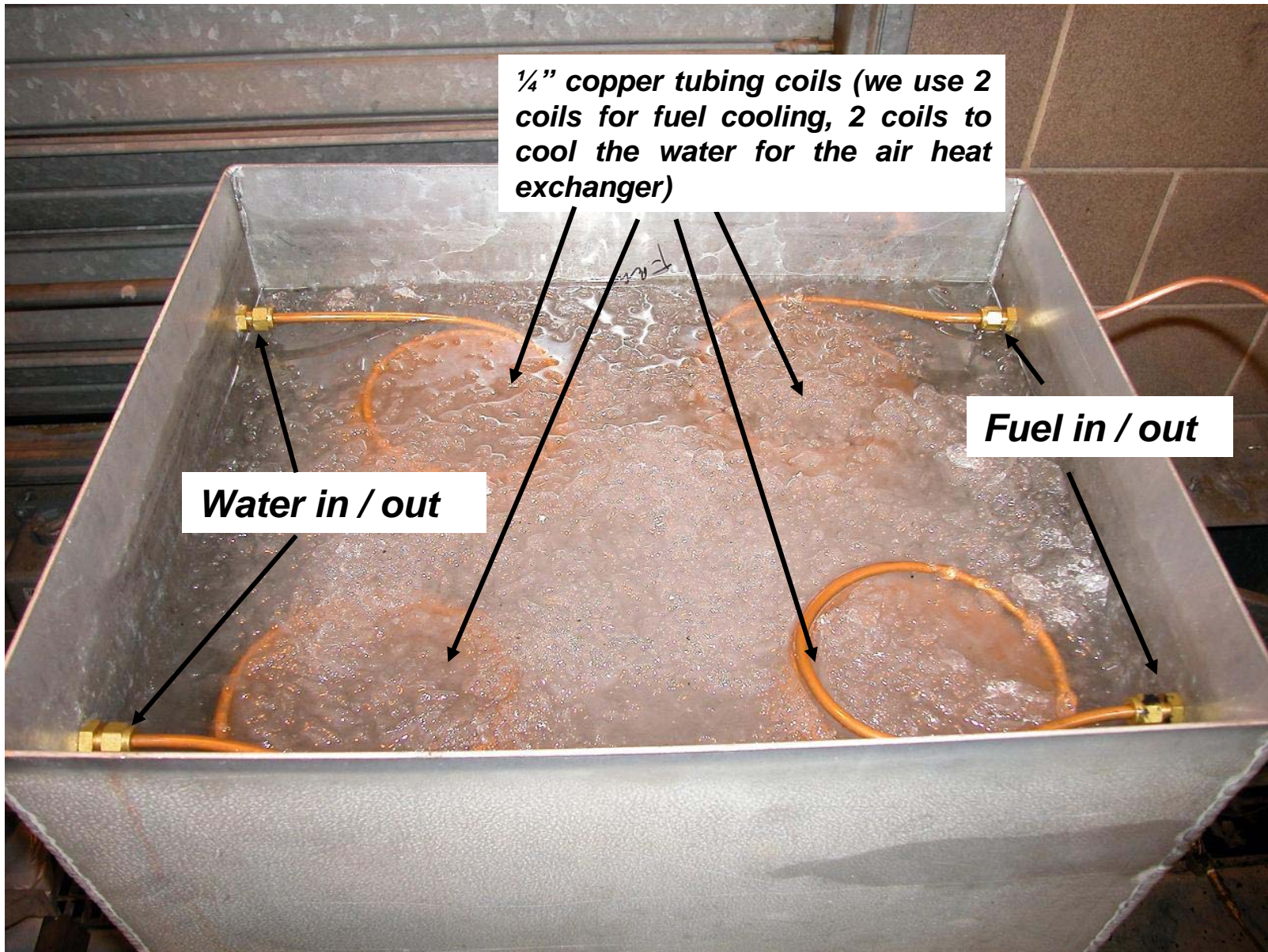


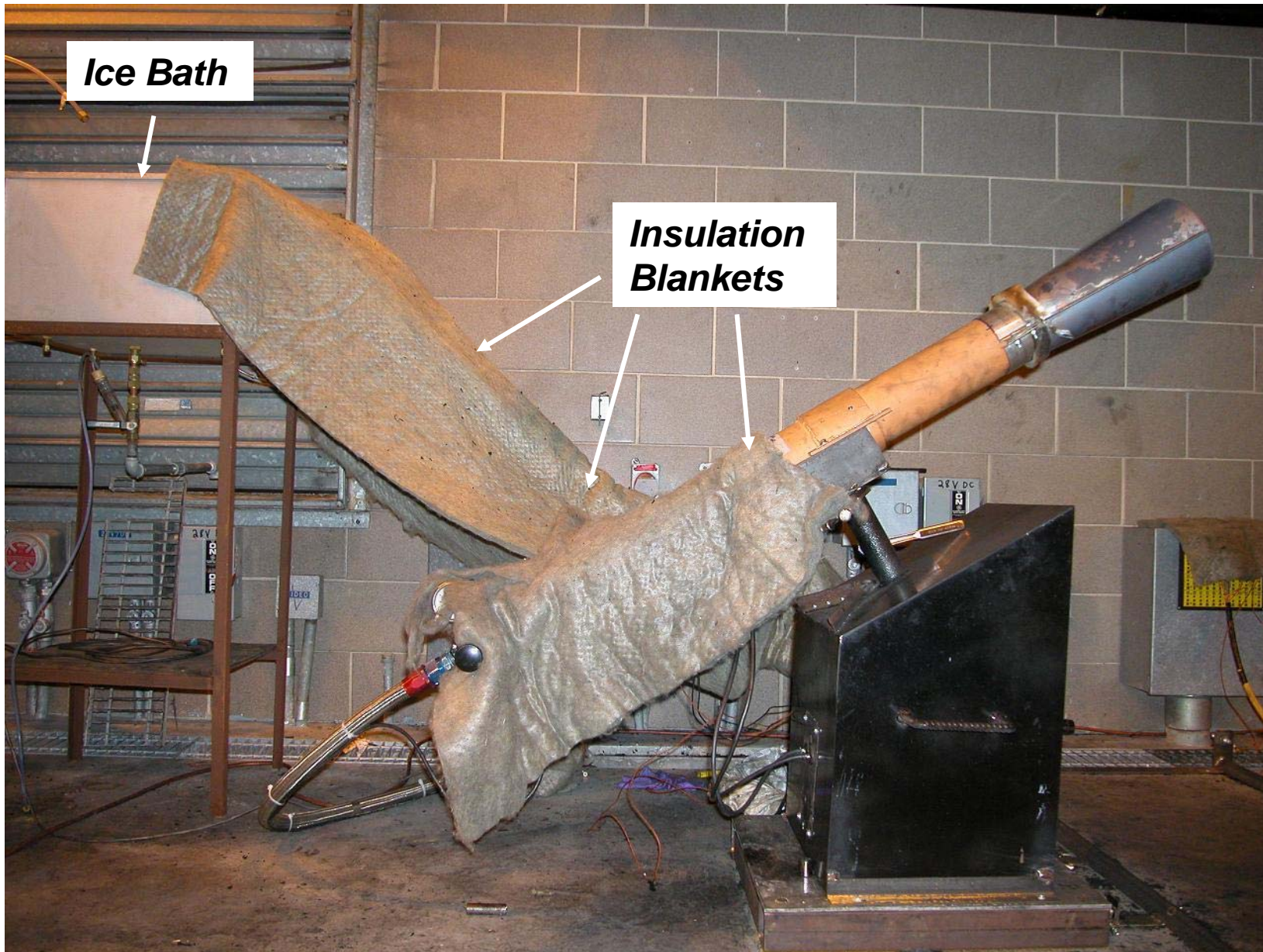


**Fuel solenoid valve**

**Fuel pressure gauge**

**Fuel thermocouple  
(1/8" dia. K-type)**

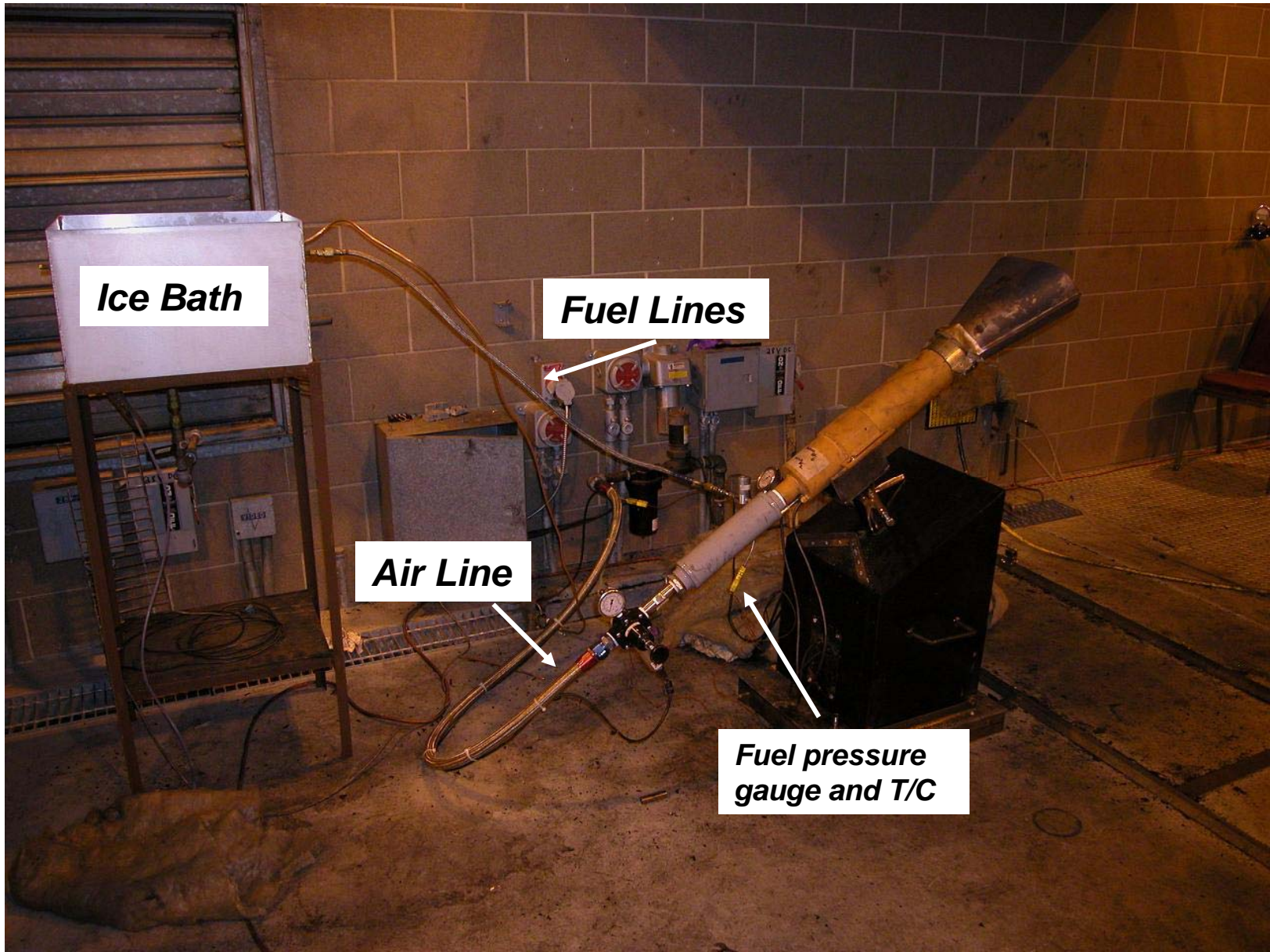


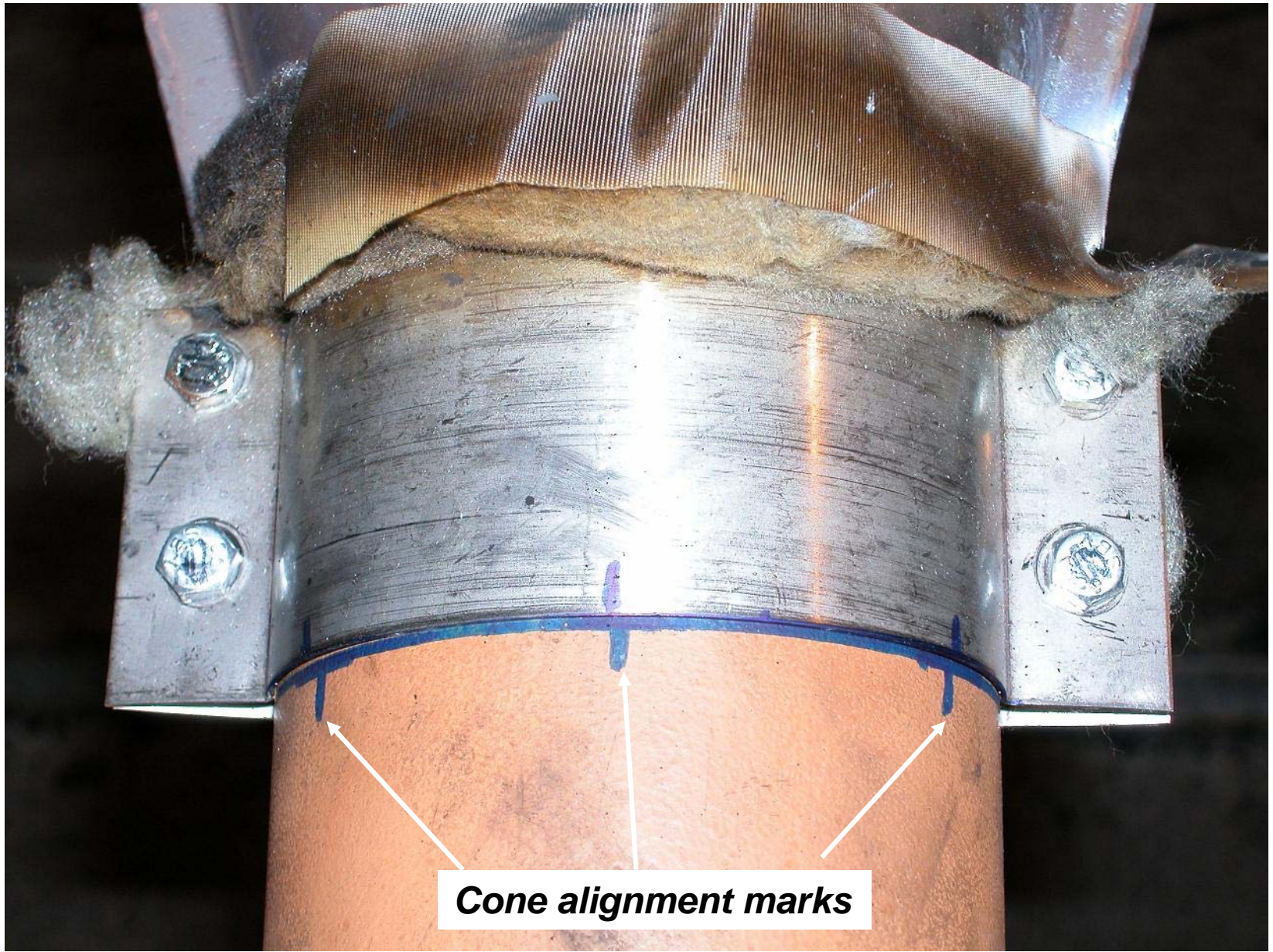


**Ice Bath**

**Insulation  
Blankets**







**Cone alignment marks**



# Contact Info

Robert I. Ochs  
DOT/FAA Technical Center  
BLDG 287  
Atlantic City Int'l Airport, NJ 08405  
[robert.ochs@faa.gov](mailto:robert.ochs@faa.gov)  
609-485-4651



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