Exactly what are pressure washing, water jetting, and low and high pressure? It is a good question. The distinction is not all that clear. Everyone has a different definition, including the current WaterJet Technology Association (WJTA) board members.

In May 2004, Cleaner Times put the question on their website and got this answer for “What is High Pressure?” from Donnie O’Neill of Covington, Louisiana:

“I think the term ‘high pressure’ should be any pressure above 2500 psi. But that also depends on whom you’re talking to and about what. A homeowner working with a pressure washer [would say] anything around 2000 psi. A person working in a plant may say 10,000 psi is high pressure.”

Pressurized water has grown from essentially garden hoses to 50,000 psi manually held field units. Descriptive terms like “Water Blasting” and “Hydro Blasting” are very common in this field.

In the Eighties, contractors were hired to remove dirt, mildew, paint, asphalt, and whatever. Owners/operators were specifying, “Use [high pressure] water blasting.” The response bids had a wide spread in price. Contractors would show up with a “high pressure water blaster” that often turned out to be low pressure and sprayed water all over the place without getting the desired cleaning results. The owners would throw up their hands and say, “We are going back to traditional methods—scraping, sand blasting, etc.” because water doesn’t work.” There was no self-regulation within the industry. People with better equipment got “low-balled.”

**Standard Terms, Relatively Speaking**

The following definitions are taken from WJTA’s “Recommended Practices For The Use of Manually Operated High Pressure Waterjetting Equipment”, November 2002, p. 34:

13.17.1—High pressure water cleaning—the use of high pressure water, with or without the addition of other liquids or solid particles, to remove unwanted matter from various surfaces, and where the pump pressure is between 5,000 psi (340 bar) and 30,000 psi (2,040 bar).
Where the term “high pressure” is used without further qualification it is considered to describe jets being used at pressures below 30,000 psi (2,041 bar).

13.17.2—Pressure cleaning—The use of pressurized water, with or without the addition of other liquids or solid particles, to remove unwanted matter from various surfaces, and where the pump pressure is below 5,000 psi (340 bar).

13.17.5—Ultra high pressure water cleaning—The use of high pressure water, with or without the addition of other liquids or solid particles, to remove unwanted matter from various surfaces, and where the pump pressure exceeds 30,000 psi (2,041 bar).

SSPC-NACE committee members had to make compromises within the painting industry. The dry abrasive blasting industry did not want “blasting” to be used in our definitions. Blasting was to be reserved for inclusion of abrasives, so we could not use the common “water blasting” or “hydro blasting” terms. We separated the issues of including solids and not including solids. We started with ultra-high at 25,000 psi and have since moved to 30,000 psi.

Wet Abrasive Blast Cleaning (WAB) is the paint industry’s term for including abrasives or solids, in low to ultra-high pressure water cleaning. WAB covers abrasives added to water streams or water added to abrasive streams, in amounts ranging from mostly abrasive with a little water to mostly water with a little abrasive. Generic terms to describe specific air/water/abrasive blast cleaning methods are: water shroud or wet-head blasting, wet blasting, low volume water abrasive blasting, and slurry blasting. Generic terms to describe specific water/abrasive blast cleaning methods are: slurry blasting, abrasive waterjetting (AWJ), or abrasive injected waterjetting/blasting (AIWJ).

Additional Definitions

Terms were defined for the coatings industry in NACE No. 5-
SSPC SP-12, “Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating,” first published in 1994, to reduce confusion and to assure that when a company asked for “high pressure” the contractors delivered the equipment and capability.

NACE NO. 5- SSPC SP-12 includes these definitions:

“Water Cleaning (WC): Use of pressurized water discharged from a nozzle to remove unwanted matter from a surface.

Standard Jetting Water: Water of sufficient purity and quality that it does not impose additional contaminants on the surface being cleaned and does not contain sediments or other impurities that are destructive to the proper functioning of waterjetting equipment.

High-Pressure Water Cleaning (HP WC): Water cleaning performed at pressures from 34–70 MPa (5,000–10,000 psig).

Low-Pressure Water Cleaning (LP WC): Water cleaning performed at pressures less than 34 MPa (5,000 psig). This is also called “power washing” or “pressure washing.”

The distinction between “low” and “high” must be made on a market-availability basis. Pumps up to 3000 psi can be found in most any industrial supply store. There are many manufacturers offering consumer and commercial cleaning packages. At around 5,000 psi, the number of pump manufacturers contracts significantly. The 5,000 psi pump packages have the safeguards and features that extend up to the 20–25,000 psi ranges. Different sectors may use the terms “low, medium, or high” at other levels or velocities.

Continuing from NACE No. 5

“Waterjetting (WJ): Use of standard jetting water discharged from a nozzle at pressures of 70 MPa (10,000 psig) or greater to prepare a surface for coating or inspection. Waterjetting uses a pressurized stream of water with a velocity that is greater than 340 m/s (1,100 ft/s) when exiting the orifice.

High-Pressure Waterjetting (HP WJ): Waterjetting performed at pressures from 70 to 210 MPa (10,000–30,000 psig).

Ultrahigh-Pressure Waterjetting (UHP WJ): Waterjetting performed at pressures above 210 MPa (30,000 psig).”

The WJTA doesn’t define jetting. Dr. David Summers has an entire chapter in “Waterjetting Technology” dedicated to “What is a waterjet?” without defining “jet.” Summers’ cleaning table starts at 70 bar (1000 psi) and 20 lpm (5 gpm). The NACE/SSPC task group thinks of “jet” as more than a pressurized stream coming out of a nozzle. The NACE-SSPC group bases their distinction on the velocity of the water stream at 1100 ft/sec—the speed of sound in air. As early as 1974, papers at the WJTA and BHRA symposiums were defining the shape of a waterjet structure in engineering terms of an initial core, a main
region, and a region of low energy droplets.

In these definitions, NACE/SSPC was distinguishing between a water stream where the water’s flow rate is the predominant energy characteristic (LP); where the velocity of the water and flow rate are equally important (HP WJ, i.e., 10,000–25,000 psi), and where the velocity of the water is the dominant energy characteristic (UHP WJ). You will also see that many companies refer to the range from 3,500–25,000 psi as “medium” pressure.

I became aware of ASTM E 1575 when a power plant asked for a safety course on high pressure waterjetting, where their pumps operate around 2000 psi. Here is a different definition from ASTM: E 1575-98 “Standard Practice for Pressure Water Cleaning and Cutting” that is under the jurisdiction of ASTM E-34 on Occupational Health and Safety:

“High-pressure water cleaning—the use of high-pressure water, with or without the additional of other liquids or solid particles, to remove unwanted matter from various surfaces, where the pressure of the liquid jet exceeds 1005 psig (6.9 MPa) at the orifice.”

I spoke with the ASTM chairman to see who was on the committee, what was their connection to the pressurized water industry, and why they set the pressure where they did. The chair said that the committee was safety and health professionals from the utility power plants, none from the waterjetting community. They had asked for help from pump manufacturers and contractors and got no response. He said that he had no knowledge of the WJTA “Recommended Practices for the Use of Manually Operated High Pressure Water-jetting Equipment.”

Most of the ASTM E 1575 is verbatim from “Recommended Practices” so someone on that committee had a copy of “Recommended Practices.” The committee felt that 1000 psig was “high.”

In the WJTA Overview given at the 2003 Biannual conference, Dr. David Summers points out that “Waterjets in a ‘Water PickTM’ can make the mouth bleed at pressures of around 100 psi.” Here you have a definition of waterjet at 100 psi.

Another Consideration

Most of our thoughts are defined for conventional steady jets. A pulsed waterjet has the flow broken into high frequency slugs or forced pulses. These pulses or “slugs” act as miniature “shock-waves” producing extremely high dynamic pressure on the target surface. In pulsed waterjets, the effect is dynamic. When the pump is set to operate at 5,000 psi [34.5 MPa], the water hammer pressure on the target would be 55,000 psi [380 MPa].

The waterjetting industry is like the computer industry. Every year, equipment available to the consumer goes higher and higher in pressure. Where you used to buy a 1,000 psi pump “off the shelf,” you can now buy 2,500 psi, and for a lower price. The “definitions” continue to change every year. Here we have “high” being used from 1000 psig on up and waterjet being used from 100 psi on up.

So, O’Neill, you have it mostly right when you say, “I think the term high pressure...depends on whom you’re talking to and about what.” I urge the pressure washing industry to adopt the NACE-SSPC definitions that go hand-in-hand with the WJTA definitions. We need continuity and unity in the industry.

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