

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**DRY HYDRANT**

(Each)

CODE 432

**DEFINITION**

A non-pressurized permanent pipe assembly system installed into water source that permits the withdrawal of water by suction.

**PURPOSE**

To provide all weather access to an available water source for fire suppression.

**CONDITIONS WHERE PRACTICE APPLIES**

Where a dependable source of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

**FEDERAL, STATE AND LOCAL LAWS 1/**

***Design and construction activities shall comply with all federal, state, and local laws, rules, and regulations governing activities in or along streams, pollution abatement, health, and safety. The owner or operator shall be responsible for securing all required permits or approvals and for performing all planned work in accordance with such laws and regulations. NRCS employees are not to assume responsibility for procuring these permits, rights, or approvals, or for enforcing laws and regulations. NRCS may provide the landowner or operator with technical information needed to obtain the required rights or approvals to construct, operate, and maintain the practice.***

***Permits may be required from the following agencies:***

- 1. U.S. Army Corps of Engineers***
- 2. WV Division of Natural Resources***
- 3. WV Public Lands Corporation***

***All contemplated projects and plans involving changes or alterations in any high quality stream, as defined in the publication "West Virginia High Quality Streams, Sixth Edition," will be submitted to the Division of Natural Resources for review.***

***Work in "Waters of Special Concern" (Appendix I) will require individual approval from WVDEP and/or WVDNR. Work in waters as shown in Appendix II require notification to the USFWS due to the presents or possible presents of endangered/threatened species.***

**CRITERIA**

Site Conditions. Site conditions shall be such that an all weather vehicle access is available to the dry hydrant or can be developed. The dry hydrant shall be reasonably close to the water source to minimize the length of suction line. This should be determined in conjunction with local fire officials. Special care and maintenance will be required when debris and fine soil particles are part of the stream bed.

Water Requirement. The quantity to be considered available to a dry hydrant is the

**NRCS, NHCP**

**March, 1999**

**NRCS, WV, TG-IV**

**September 2001**

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service</p>
---

minimum available (at not over 15 feet total static lift) during a drought. A minimum of 30,000 gallons (1.1 acre-inches) of pumpable impoundment water or a minimum pump flow rate of 250 gpm without interruption for 2 hours is considered a dependable water supply.

Location. A location map showing the exact site of the hydrant and vehicle access shall be furnished local fire department with a copy to the landowner. A letter of approval to use the site shall be obtained from the landowner prior to construction. Access, topography, and location should be reviewed by fire department personnel prior to installation.

The fire truck connection shall be within 10 feet of the edge of an all weather access road. The all weather access road and fire truck pumper connection shall be higher than the auxiliary spillway elevation if installed in a constructed impoundment.

Water supply. The adequacy of the water supply from impoundments shall be determined in accordance to appropriate local criteria. The RESOP or similar computer program can be used to determine the water supply contained by earthen construction or water impounding embankments. The adequacy of stream flow source can be determined from regional analysis of stream gage data.

Pipe. The pipe material may be iron, steel or plastic. Plastic pipe shall be schedule 40, SDR-26 or otherwise protected from ultraviolet rays. No more than two 90-degree elbows shall be used in the entire pipe system. Pipe shall be 6 inches nominal diameter or larger. The pipe shall be fitted with intake screen or strainer and standard fire truck hose adapters for quick connect/release operations acceptable to the local fire department.

The depth at which the pipe is installed shall be below the frost-free depth for the area.

Pipe Intake. The pipe intake depth shall be calculated from the design water elevation plus pipe diameter plus 2 feet. The intake screen should have a minimum opening of 4 times the

pipe cross sectional area. Where the intake is more than 3 feet off the bottom, a trash rack may be used in lieu of a screen.

A dry hydrant installation shall provide for a positive slope toward the water source. In pits or impoundment's, the intake screen or strainer shall be supported and secured at least two feet above the pool bottom. The intake shall be at least 4 feet beyond the earth slope.

To avoid a vortex or whirlpool during pumping, the top of the inlet pipe shall be at least 2.0 feet below the design water level unless a special design is prepared to prevent vortex.

Pump Lift. The top of the fire truck pumping connection or centerline of pump (whichever is higher) shall be no more than 15 feet in elevation above the bottom of the fire protection pool or stream surface during drought conditions.

The fire truck connection shall be approximately 24 inches above the ground surface, but never higher than the intake of the using fire truck.

The total lift (pumping head) shall not exceed 20 feet when all losses are totaled. Pumping head for each site shall include head loss from screen or strainer, elbows, line friction, elevation (static head), and hard rubber or flexible suction hose to the fire truck.

Dry Hydrant. Dry barrel (conventional) hydrants may not be used due to excess suction loss and the necessity that they be absolutely airtight.

A recessed hydrant (below ground-level connection) may be specified for use in areas with special needs, such as in a high vandalism area or for low profile and esthetic needs. It is also referred to as a flush mount hydrant and does not require the 24 inch riser. It may be used with the 45° or straight dry hydrant head assembly.

Dry Hydrant Head. The hydrant sleeve shall be made of bronze, brass, aluminum alloy or other durable, non-corrosive metal. Sleeve must be permanently affixed inside a PVC head using epoxy adhesive and stainless steel bolts.

The hydrant head shall be able to accept a 6 inch NHT (American National Fire Hose Thread) connection to provide maximum supply. Hydrant (6 inch) head shall conform to ASTM 2466.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "O" ring between the threaded sleeve and PVC head.

Dry Hydrant Cap. The cap shall be of snap-on/snap-off design and removable without special tools. It shall be joined with a steel cable or chain and be permanently attached to the dry hydrant head. The cap shall be hard plastic or of same metal as NHT connection for maximum corrosion resistance.

Strainer. The strainer shall be fabricated from PVC material compatible with the pipe. Individual inlet holes shall not exceed 3/8-inch diameter. All components, including pins, shall be non-corrosive. Manufactured well screens shall be corrosion resistant. Screens and strainers shall have a minimum open area of 4 times the pipe cross sectional area.

A strainer may be formed by drilling 1/4 inch to 3/8 inch diameter holes with a minimum of one hole diameter between the holes in PVC pipe. Drill holes shall be deburred and the pipe cleaned before putting the strainer into service. The screens or strainers shall be capped with a removable end cap.

End Cap. The end cap must be easily removed without special tools. Perforations are recommended in the end cap, also, to improve flow conditions into the strainer and for jetting action for silt cleanout.

Materials. All materials shall meet or exceed the minimum requirements for materials described in the various sections of this standard."

Access. Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall have an all-weather surface, be well drained and be at least 12 feet wide for ease of movement by personnel and

equipment during an emergency. When local road traffic may be involved, an all-weather road surface adjacent to the dry hydrant and completely off the public road is recommended for safety of the emergency personnel and the public.

Protection. After the dry hydrant installation, the site shall be graded for surface drainage and vegetated or otherwise protected from erosion. Vegetation shall be in accordance with Critical Area Planting Standard and Specification (342).

## CONSIDERATIONS

1. Effect of the use of the dry hydrant on upstream and downstream water quantity.
2. Sediment production caused by erosion during construction.
3. Possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.
4. This practice has the potential to negatively affect National Register listed or eligible (significant) cultural resources (archaeological, historical or traditional cultural properties); it also has the potential to protect listed or eligible historic structures. Consider these factors during planning and also follow the NRCS State policy during construction and maintenance.

## PLANS AND SPECIFICATIONS

Plans and specifications for installing dry hydrants shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Required permits shall be obtained prior to initiating any work. **Resources available are standard forms WV-ENG-70 or TSC-NE-ENG-606 and WV "700 series" specifications or the specification attached to this standard.**

## OPERATION AND MAINTENANCE

Keeping the site clear of obstruction and regular mowing of the dry hydrant access area will be required to keep the area readily available for emergency use.

NRCS, NHCP

March, 1999

NRCS, WV, TG-IV

September 2001

Pumper testing of the dry hydrant shall be done at least annually to verify site usability. This test shall include back flushing, followed by a pumper test at the maximum designed flow rate. Careful attention should be given to silt, debris, aquatic growth, or other interference that may limit the full operation of the dry hydrant.

Checks of the intake screen should be made once every five years to identify any sediment build up and to provide information for a clean-out operation or for aquatic growth control

needs. The hydrant should be back-flushed each spring and fall to remove any silt or debris that may have accumulated on the screen.

***1/ Information shown in Bold Italics is WV supplemental additions to the National Standard. The following appendices and construction specification are also WV additions.***

## APPENDIX I

### WATERS OF SPECIAL CONCERN

"Waters of Special Concern" — are those rivers or streams whose unique character, ecological or recreational value or pristine nature constitutes a valuable national or state resource and shall include but not be limited to the following waters of the state, West Virginia Code of State Regulations, Requirements Governing Water Quality Standards Title 46, Series 1:

- a) All Federally designated rivers under the Wild and Scenic Rivers Act, Public law 95-542, as amended, 16 U.S.C. 1271, *~et seq* (Bluestone River from the upstream boundary of Pipestem State Park to Bluestone Reservoir, Meadow River from near the US 19 bridge to its junction with the Gauley River, also included are all rivers within the Monongahela National Forest designated as National Wild and Scenic Study Rivers);
- b) All naturally reproducing trout streams in the following counties: Barbour, Fayette, Grant, Greenbrier, Hampshire, Hardy, Mercer, Mineral, Monroe, Nicholas, Pendleton, Pocahontas, Preston, Raleigh, Randolph, Summers, Tucker, Upshur and Webster. For information about specific streams, contact Wildlife Resource Section, Trout Fisheries Program at 304-367-0245;
- c) All streams and other bodies of water in State and National Forests and Recreation Areas (included are streams and bodies of water located within the Spruce Knob, Seneca Rocks, and Gauley River National Recreation Areas); and
- d) The New River National River, National Parks and Recreation Act of 1978, Public Law 95-625, as amended.

## APPENDIX II

### WV STREAMS WITH PRESENCE/POTENTIAL PRESENCE OF ENDANGERED/THREATENED SPECIES

**Work in any of the following streams required notification to the USFWS due to the presence or possible presence of endangered/threatened species:**

- |   |   |
|---|---|
| <b>Back Creek</b> — Berkeley County                                   | <b>Middle Island Creek</b> — Doddridge, Tyler, and Pleasants Counties           |
| <b>Beaver Creek</b> — Raleigh County                                  | <b>New River</b> — Raleigh, Summers, and Fayette Counties                       |
| <b>Bluestone River</b> — Mercer and Summers Counties                  | <b>North Fork Hughes River</b> — Ritchie County                                 |
| <b>Buckhannon River</b> — Upshur County                               | <b>Ohio River</b> — Cabell, Mason and Wood Counties                             |
| <b>Buffalo Creek</b> — Raleigh County                                 | <b>Potts Creek</b> — Monroe County  |
| <b>Cacapon River</b> — Morgan County                                  | <b>Sleepy Creek</b> — Morgan County   |
| <b>Clover Creek</b> — Pocahontas County                               | <b>South Fork Hughes River</b> — Ritchie and Wirt Counties                      |
| <b>Dunkard Creek</b> — Monongalia County                              |   |
| <b>Elk River</b> — Braxton, Clay and Kanawha Counties                 |   |
| <b>Gauley River</b> — Nicholas and Fayette Counties                   | <b>South Fork Potts Creek</b> — Monroe County                                   |
| <b>Greenbrier River</b> — Greenbrier, Pocahontas and Summers Counties | <b>West Fork Greenbrier River</b> — Greenbrier, Pocahontas and Summers Counties |
| <b>Hackers Creek</b> — Lewis County                                   | <b>West Fork River</b> — Lewis, Harrison Counties                               |
| <b>Hughes River</b> — Ritchie and Wirt Counties                       | <b>Wetlands</b> — Berkeley County   |
| <b>Kanawha River</b> — Kanawha Falls to Alloy, Fayette County         |   |
| <b>Little Kanawha River</b> — Calhoun, Gilmer, and Wirt Counties      |   |
| <b>Marsh Fork</b> — Raleigh County                                    |   |
| <b>Meadow River</b> — Greenbrier and Fayette Counties                 |   |
| <b>Meathouse Fork Middle Island Creek</b> — Doddridge County          |   |

**CONSTRUCTION SPECIFICATION****WEST VIRGINIA****Dry Hydrant****Excavation**

Trenches for plastic pipelines shall be free of rocks and other sharp-edged materials. Pipe shall not be laid on rock unless special protective measures are installed, such as excavating the trench one (1) foot deeper than required and back-filling with clay or other suitable soil.

**Testing**

Testing before backfilling is not required.

**Materials**

All materials shall be inspected to verify that they meet the requirements shown on the drawings. Pipe and fittings used for the pipeline shall be new, or otherwise in new condition.

Steel pipe shall meet the requirements specified in ASTM A120 or in AWWA C200. If, because of local conditions, a coal-tar enamel protective coating is needed for steel pipe, the coating shall meet the requirements of AWWA C203. Plastic pressure pipe shall be suitable for underground use. The pipe shall conform to the requirements of the following ASTM specifications:

D1785, Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120

D2241, Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR) [SDR 26 or lower]

D2665, Polyvinyl Chloride (PVC) Drain, Waste, and Vent Pipe and Fittings.

D1527, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80

D2282, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR) [SDR 26 or lower]

Standard thermoplastic pipe material designation code for PVC pipe will be 1120 or 1220 and for ABS pipe it shall be 1316 or 2112.

Pressure pipe fittings shall conform to the requirements of the following ASTM specifications:

D2466, Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

D2467, Socket-Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80

D2464, Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80

D2468, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40

D3139, Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

Material designation for PVC pipe fittings will be PVC I or PVC 12 and for ABS pipe fittings the designation will be ABS 13 or ABS II.

Solvents for solvent-welded pipe joints shall conform to the following ASTM specifications:

D2564, Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings

D2235, Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

## D2855, Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

### **Backfilling**

All backfilling shall be completed before the line is placed in service. The trench will be kept free of standing water to allow for proper placement and compaction of the backfill.

For plastic pipe, the initial backfill shall be Type 1 or 2 as specified on the drawings, and as follows:

Type 1 - The pipe will be embedded in fine grained soil backfill (cl, ml or sm soil) free from rocks or other sharp-edged material that would damage the pipe and hand compacted in 6 inch lifts to one pipe diameter above the top of the pipe. Compaction shall consist of four passes of the compaction equipment over each lift.

Type 2 - The pipe shall be embedded in soil material as described in Type 1 above except that the soil will be compacted to 95% of standard proctor (ASTM D698 method A) density with soil at  $\pm 2\%$  of optimum moisture content; or the pipe will be embedded in a

sand/gravel material to a depth of one pipe diameter above the top of the pipe. Sand/gravel mixtures may be ASTM C33 sand, #6, #7, #8 or #67 aggregate and will be hand compacted in 6 inch lifts with four passes of vibratory or other hand operated compaction equipment.

The remaining trench backfill and backfill of installations where steel pipe is used shall be such that the density of the backfill will be at least equal to the natural density of the trench sidewalls. Deformation or displacement of the pipe must not occur during backfilling.

Over excavation of the trench bottom shall be backfilled to the same requirements as specified for the initial backfill around the pipe.

The soil moisture content of the backfill material, for all conditions except Type 2 initial backfill above, shall be wet enough that a ball can be formed when the soil is squeezed in the hand but not so wet that water runs out of the ball when squeezed.

Backfill of plastic pipe should be done after the pipe reaches the same temperature as the water or soil. This can be done in a number of ways, such as filling with water or by leaving the trench open overnight before backfilling.

### **Protection**

Construction operations shall be carried out in such a manner and sequence that erosion and air and water pollution will be minimized and held within legal limits. All disturbed areas will be graded smooth and blend with the surrounding ground prior to the seeding operation.

Guard posts, signs or other safety measures will be installed as shown on the drawings.

Access roads, when required, will be constructed to meet the requirements of the drawings and specifications for that practice.

Areas disturbed by construction shall be stabilized by the establishment of vegetation. Lime and fertilizer will be spread at the rate shown on the drawings and will be raked or tilled into the soil to a depth of 2 -3 inches to prepare a seedbed. Seed and mulch will be spread at the rate shown on the drawings. Temporary vegetation, mulches or gravel may be used when climatic or other conditions do not permit establishment of permanent vegetation.