NATURAL RESOURCES COMMISSION
Information Bulletin #40 (First Amendment)

SUBJECT: Methods of Measuring the Amount of Water Withdrawn by a Significant Water Withdrawal Facility

PURPOSE: The purpose of this Information Bulletin is to describe methodologies approved by the natural resources commission to calculate the amount of water withdrawn annually from a "significant water withdrawal facility" as defined at IC 14-8-2-257.

1. Rate of Flow Metering Devices
Rate of flow meters are used to quantify fluids that pass in a continuous stream rather than in isolated or separately counted quantities. These meters are dependant upon some property of the fluid other than, or in addition to, volume or mass. They are designed to use a change in the property or properties associated with the rate of flow, and they usually include a device that manually or automatically records a measurable change. The rate of flow multiplied by the time of operation equals the amount of water withdrawn for that period of time, so the time of operation must also be tabulated. There are several principles that can be used in recording the rate of flow:

a) Differential (Variable) Pressure Type Meters – These systems involve the pressure differential at two points in full flowing systems. When flow varies, the pressure difference measured by such devices also varies and both functions can be correlated with reasonable accuracies through various types of accessory instrumentation. *Examples include venturi meters, flow nozzles, orifice meters, pilot tubes, and annubars*.

b) Steady Pressure (i.e., Steady Head) Type Meters – These systems discharge into the atmosphere. *Examples include irrigation nozzles that are available with reasonably accurate flow vs. pressure calibrations*.

c) Overflow (Head Area) Type Meters – These systems measure variation in levels of gravity flow (i.e., non-pumped) systems. As flow varies in a channel, the depth upstream of a restriction in partially filled conduits varies and these functions can be correlated with reasonable accuracies. The key element needed in this type of system is water depth that can be measured with accessory instrumentation or simply with a depth gage. *Examples of such restrictions are weirs and flumes.*

d) Current Type Meters – These systems utilize a wheel or propeller, which rotates when immersed in flowing water, and a device to determine the number of revolutions of the wheel or propeller. The number of revolutions is then related to fluid velocity. The method can be utilized where water withdrawals travel through a pipe or an open channel.

2. Time of Pump Operation
Water withdrawals can be measured based upon the time each pump supplying a water withdrawal facility is operated multiplied by the capability of the respective pump. The time of operation can be recorded manually in a written log or by means of an automatic time meter. The cost of installing a time meter on a pump is relatively low, and being aware of the pump design discharge, pump efficiency, and time of pump operation allow for a fairly accurate record of water withdrawals. Pumping rates can also be determined for specified periods of time from a manufacturer's calibration graph by correlating volume flows with electrical loads and with discharge pressures.

Past Performance Comparison
Some industries have a direct relationship between the amount of water withdrawn and the quantity of product manufactured or handled. In order to measure water withdrawals using a past performance comparison, the owner of a significant water withdrawal facility must provide the division of water with adequate supporting data to establish the relationship between water withdrawals and the amount of production.

3. NPDES Data
Many businesses and industries monitor the amount of water that is discharged to the State's rivers or streams as a part of their NPDES permit. When water use is non-consumptive and no additional inflow occurs, the amount of discharge water closely reflects the amount of water withdrawn. Ascertaining individual water withdrawals for facilities having more than one well or intake can be difficult, but this method may be acceptable in some cases. In order to measure water withdrawals using NPDES data, the owner of a significant water withdrawal facility must provide the division of water with supporting data to verify that the discharge is reflective of the amount of water withdrawal.

4. Direct Measurement of Amount Applied

A system using "rain gage" type of equipment can be installed to measure the amount of water applied to a given area (typically in agricultural applications). The water applied multiplied by the number of acres irrigated equals the amount of water withdrawn (e.g. 1 acre-inch equals 27,154 gallons). The gaging system must be carefully monitored in order to differentiate between water applied by irrigation and that contributed by precipitation. In order to measure water withdrawals using direct measurement, the owner of a significant water withdrawal facility must obtain prior approval from the division of water.

5. Quantity Metering Devices

Quantity metering devices function by having water pass in successive and completely isolated amounts, measured either by weight or volume, by alternatively filling or emptying containers of known or fixed quantities. The simplest of these devices is a holding tank or a reservoir with a known volume. When the tank or reservoir is filled from a significant water withdrawal system, the water must be accounted for by a logging method that applies to either partially filled or full flowing systems. *Examples of weighing meters include weighing tanks and tilting traps. Volumetric meters include holding tanks and reservoirs, reciprocating piston, rotary piston, and nutating disk*.

6. Other Methods

In order to use a method other than those approved in this Information Bulletin to measure the amount of water withdrawn by a significant water withdrawal facility, the owner of the facility must provide the division of water with the following:

1) an explanation or description of the proposed method; and
2) supporting data sufficient to satisfy the division of water that the method provides for an accurate representation of the amount of water withdrawn.

HISTORY: This information bulletin was approved by the commission in 2003 and was published in the January 1, 2004 Indiana Register at 27 IR 1426. On January 16, 2007, the Commission reviewed and affirmed this bulletin. This bulletin was amended to include a history line.

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