DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING PROGRAMS

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TITLE: Water Supply Replacement and Permitting

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AUTHORITY: The Surface Mining Conservation and Reclamation Act (SMCRA), The Clean Streams Law

POLICY: The Department of Environmental Protection will assure that a suitable replacement is available for any water supply that may be affected by surface coal mining activities.

PURPOSE: This guidance is necessary to provide a definition of what constitutes a water supply replacement; where a waiver of water supply replacement would be acceptable in lieu of replacement; and to establish procedures for the processing of permit applications when water supply sources may be adversely affected by surface mining activities.

APPLICABILITY: This policy applies to District permit reviewers and to surface coal mine operators proposing mining operations that may impact water supplies and their consultants.

DISCLAIMER: The policies and procedures outlined in this guidance are intended to supplement existing requirements. Nothing in the policies or procedures shall affect regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of DEP to give the rules in these policies that weight or deference. This document establishes the framework within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

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TABLE OF CONTENTS

BACKGROUND

The District Mining Office (DMO) may issue a surface mining permit only where the applicant has provided a demonstration that surface mining activities will not result in pollution of waters of the Commonwealth. Department regulations at 25 Pa. Code §§87.47, 87.119, 88.27 and 88.107 require prospective surface mine operators to identify the probable hydrologic impacts of the proposed mining operation, including the identification of water supply sources which may be lost, diminished or interrupted as a result of these activities and to provide a demonstration of the availability of an adequate replacement for such supplies.

Where an operator cannot demonstrate that a proposed operation will not result in pollution to the waters of the Commonwealth, including its groundwater, the permit application shall be denied. Accordingly, this policy document deals only with the loss, diminution, interruption and replacement of water supply sources.

PROCEDURE

A. Background Data

Pursuant to §§87.54(a)(6), 87.45, 87.46, 87.69, 87.101, 87.102, 87.115, 87.116, 87.117, 87.119, 88.31(a)(6), 88.25, 88.26, 88.49, 88.91, 88.92, 88.105, 88.106, 88.107, and 88.201, the application for a surface coal mining permit must show:

1. The location and name of all public water supplies that have intakes on the receiving stream within 10 miles (16.09 kilometer) downstream and public water supply wells within 1/2 mile (0.80 kilometer) of the proposed permit area; and

2. The location and the owners and uses of private water supplies on or within 1,000 feet (304.8 meter) of the proposed permit area, as well as those at a greater distance which may be affected by the proposed operations.

In addition, water supply surveys on each of the water supplies identified above must be provided in the Hydrology Module of the surface mining permit application with each individual supply identified with a sample point number and keyed to the Environmental Resource Map.

A *water supply survey* is: the collection of reasonably available information for a water supply to establish:

1. The location, type and use of the water supply.

2. The chemical and physical characteristics of the water.

3. The quantity of the water.

4. The physical description of the water supply, including the depth and diameter of the well, length of casing and description of the treatment and distribution systems.

5. Hydrogeologic data such as the static water level and yield.

Private water supply information that is reasonably available is information that can be collected without extraordinary efforts or the expenditure of excessive sums of money.

Quality characteristics must be provided in accordance with the Hydrology Module of the surface mining permit application. Water samples obtained from a private supply should document the raw, natural quality of the source. Treatment systems on a private water supply should be bypassed when documenting raw water quality. In addition, proposed replacement sources must include analyses for bacteria. All water supplies that may be affected must be documented by quality and yield and must be included in the quarterly monitoring program.

B. Hydrologic Assessment

Pursuant to §§87.47 and 88.27, the applicant for a surface mining permit must identify each water supply source that may be contaminated, lost, diminished or interrupted as a result of the proposed surface mining activities. If a water supply source may be affected, the applicant must demonstrate the availability of an alternate water supply source to restore or replace the affected water supply by identifying the quantity and quality of the proposed replacement source and how the source will be developed.

Demonstration of the availability of the replacement supply may be made through information from existing water wells and springs that document the source's hydrologic characteristics. If this information is not available, development of water wells into the proposed replacement source will be necessary. The replacement water supply source should be hydrologically isolated from impact by the proposed surface mining activities.

When the applicant cannot or does not demonstrate the availability of a replacement water supply source, the proposed mining operation must be tailored to eliminate the potential for affecting the particular existing water supply or supplies.

C. Notice to the Water Supply Owners

Where a permit, if issued, may lead to the loss, diminution or interruption of a water supply, the DMO has a legal obligation to provide written notice to the water supply owners and users during the permit application stage. Permit applicants currently identify persons who "may" experience an interruption, diminution, or loss of their water supply source. The DMO must notify these persons by certified mail of the permit application that they may lose their water supply if the permit is issued. The letter must address how their water supply would be replaced if affected by the mining operation. The letter must be sent to the water supply owners at the earliest opportunity after the replacement supply has been adequately demonstrated, and always prior to bond request. See Appendix A for sample notice.

D. Quality

Pursuant to SMCRA Section 4.2 (f) and §§87.119 and 88.107, the replacement or alternate water supply must be adequate in quality for the purpose served by the supply. In other words, unless everyone with an ownership interest in the water supply specifically agrees to a supply of lesser quality, the replacement supply must be adequate to support all existing and reasonably foreseeable uses that would be supported by the original supply.

The quality of proposed replacement sources will be evaluated based upon values of pH, alkalinity, acidity, iron, manganese, sulfates, and suspended solids. In addition, bacteriologic analyses for total coliform must be included. If any other parameters that may affect the usability of the proposed replacement source are suspected or are known to occur in the source in question, the analysis should also include those parameters.

Hardness of the replacement supply may be a parameter to consider under certain instances. Hardness of the existing supply should be compared to hardness of the replacement source. If the replacement supply exceeds the hardness of the original supply, the difference in hardness must not place a burden upon the user or significantly alter the uses of the supply.

Guidelines concerning recommended water quality standards for individual private water supplies are found in EPA, 1991, Manual of Individual and Non-public Water Supply Systems, EPA 570/91-004. The manual is readily available as a reference to the public from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. It provides useful information on the development of individual water supplies.

The use of treatment in order for a replacement source to meet the uses of a specific supply is not a demonstration of the availability of an alternate or replacement source. The quality of the proposed replacement supply cannot be of lesser quality than the existing supply unless the applicant obtains written consent of everyone with an ownership interest in the water supply by executing the appropriate water supply replacement agreement (Appendix D).

E. Quantity

Pursuant to §§87.119 and 88.107, the proposed alternate supply must be capable of providing adequate quantity for the purpose served by the supply. Unless everyone with an ownership interest in the water supply specifically agrees to a lesser supply by executing a water supply replacement agreement (Appendix D), the quantity of the proposed replacement supply must be the same as, or greater than, the quantity available from the existing supply. This determination requires yield tests on the existing supply (conducted prior to final permit disposition) and on the proposed replacement source (conducted at the time of development).

An exception may only be granted when the yield cannot be determined from the existing water supply (e.g., spring flow with no outlets or buried wells) or when the quantity of water available from the existing supply is substantially greater than the owners would require for any reasonably foreseeable use. Under these conditions, the DMO may consider a demonstration from the applicant that the proposed alternate water supply will be sufficient to meet the needs of the water supply owners. This demonstration must reflect all reasonably foreseeable uses at the time of permit application review. These include any existing, currently designated, or currently planned use of water for human consumption or for agricultural, commercial, industrial or other uses. Reasonably foreseeable uses are those that a reasonable party expects to arise in the foreseeable future, are based on the present uses of the land, and are founded on concrete, identifiable plans.

Guidelines concerning recommended minimum quantity standards for individual private water supplies utilized for various demands are found in the EPA Manual of Individual and Non-public Water Supply Systems and in Appendix B.

F. Interruption

While the owners and users of the water supply have a right to an uninterrupted water supply, the Department shall be sensitive to the cost of replacement imposed upon the surface mine operator. A requirement to replace a water supply prior to mining must be imposed with discretion, and only when the Department is confident that the loss will actually occur. A demonstration must be made that alternate water supply sources are available and should include arrangements for providing a temporary, potable supply within 48 hours of notice of interruption. The temporary water supply must remain until the permanent replacement supply is developed and ready to be used. When a water supply will definitely be affected by a proposed mining operation, the replacement supply must be in-service and demonstrated to be adequate before mining on a bonding increment that would impact the original supply begins. A special permit condition should be incorporated into the permit relating water supply development to the mining sequence. Unless a lesser, temporary quantity is agreed to by an affected water supply owner, a temporary supply must be capable of meeting all the needs of the owner at the time of the water supply impact.

G. Costs

When an applicant proposes a replacement supply as part of a permit application, the applicant must provide information concerning existing and proposed operating costs. The worksheets in Appendix C, "Cost Calculation Comparisons for Existing and Replacement Supplies," have been developed for use in determining the differences in the operating costs between the existing and replacement supplies. Appendix C is used as a supplement to Module 8.6 of the surface mining permit application. A final determination of the adequacy of a replacement supply should be made after installation. The quantity and quality of that supply and its operation and maintenance costs can then be verified under actual in-service conditions. Verification should take place within a reasonable timeframe (several months).

For a replacement or restored water supply to be adequate, any additional maintenance or treatment costs that are not *de minimis*, must be borne by the applicant. The term "*de minimis* cost increase" is defined in §§87.1 and 88.1 and is addressed in §§87.119 and 88.107. A *de minimis* cost increase is defined as an annual cost increase that is either less than $60.00 per year or 15% of the annual operating and maintenance costs of the original supply. If the cost increase is not *de minimis*, the applicant must compensate the affected water supply owner for <u>all</u> increased expenses associated with operation of the replacement supply, not just those costs that exceed the threshold amount. The operator is responsible for covering the additional costs "*ad infinitum*."

In cases where operation and maintenance costs are more than *de minimis*, the applicant may choose one of the following options:

1. If the supply owners will accept all maintenance costs, the applicant must provide a water supply replacement agreement stating that the operator and everyone with an ownership interest in the water supply have agreed on a settlement for any increase in operation and maintenance costs (see Appendix D). Usually, a lump sum payment is offered to the owners as compensation for accepting the increased operation and maintenance costs.

2. The applicant must provide the details of the financial mechanism that will provide for future payments. One method of paying for future increased maintenance costs would be through an irrevocable letter of credit established with a bank by the applicant. When the need would arise, the water supply user would be able to draw drafts from the bank to pay maintenance and treatment costs. Another method of covering the increased maintenance cost would be for the applicant to create a trust fund from which the water supply user could draw his expenses. If the applicant proposes one of these or some other method of compensation, the DMO must forward the proposal to the Department's legal counsel for review and comment.

When a public water system is designated as a replacement source, the applicant must provide a letter to the Department from the public water utility that states: (1) that the utility will allow connection of the affected owners and users; (2) that the affected owners and users are within the utility's franchise area; (3) who will bear the responsibility for construction of the extension and hook-up; and (4) the estimated total cost of the connection. The applicant must complete the cost calculation worksheet (Appendix C) to determine if the additional monthly utility payment is *de minimis* in comparison to the operation and maintenance cost of the original water supply.

H. Reliability of the Water Supply

Replacement water supplies must be reliable. Wells with very low yield may not fulfill this requirement for a variety of reasons. Most judgments as to reliability are based on one pump test of limited duration. Generally, this test will not reflect the minimum seasonal yield. Additionally, wells can experience a natural decline in yield through time. Low-yielding wells may develop an encrustation of the well bore, and, therefore, have a shorter life-span than higher yield wells. For example, a decline of 30% for a well yielding 10 gpm ($63.09 \times 10^{-2} dm^3/s$) would probably go unnoticed; however, a similar decline in a well producing 4 gpm ($25.24\ 10\text{-}^{2} dm^3/s$) may result in the supply being inadequate. In any event, declines are far more critical in low-yield situations.

Ultimately, the adequacy of a replacement supply can only be determined by the demands placed upon the replacement supply once it is put in service. Under certain circumstances, the maximum yield of a well, once it is put into service, may experience a long-term decline. The initial specific capacity of a well may decline by 40 % over the first year of use. For this reason, a final determination of the suitability of a replacement supply can only be made with confidence when the supply has been in use for a period of time (one year or more) and has undergone the rigors of actual use.

In lieu of a 5 gpm ($31.54 \times 10^{-2} dm^3/s$) well yield, there may be instances where a water storage system may be considered to augment a low-yielding well to provide for peak demand; however, the system must be adequate "for the purposes served by the supply." As a rule of thumb, water storage systems should only be considered where the yield is close to 5 gpm ($31.54 \times 10^{-2} dm^3/s$) or where the long-term reliability and adequacy of a lesser yield can be demonstrated. In order to be acceptable, a water storage system should provide a sustainable yield equivalent to 5 gpm ($31.54 \times 10^{-2} dm^3/s$) during peak demand, unless the applicant can demonstrate that something lesser will be adequate or everyone with an ownership interest in the water supply signs an agreement to a lesser supply. Water storage systems are susceptible to bacteriological contamination; therefore, storage systems should include a disinfecting mechanism. Typically,

water storage systems require greater maintenance, generate higher operation and maintenance costs, and require more space than conventional systems.

I. Owner Control of the Replacement Water Supply

The applicant must demonstrate that a water supply owner will be able to retain control over the replacement supply, at a level that is substantially equal to their control over the existing supply. A public water supply, as defined in 25 Pa. Code Chapter 109 "Safe Drinking Water," will be considered an adequate replacement supply of equal control, unless the public water supply would not be adequate on other grounds such as inadequate or unreliable yield or quality.

Where a landowner has exclusive control over an existing private source of water and a proposed replacement source of water will supply more than one landowner, the applicant must demonstrate that the landowners will each retain substantially equal control over the replacement supply or consent to lesser control.

A replacement water supply developed on a property not under the ownership or control of the affected water supply owners should include an easement document which grants the water supply owners access to the property for maintenance and control of the replacement supply.

J. Complete Waiver of Replacement

If an original supply has been abandoned for all purposes, or clearly will be, there is no need to demonstrate the availability of a replacement water supply. In such cases the applicant must demonstrate in writing that everyone with an ownership interest in the water supply:

1. Understands his or her rights under Section 4.2(f) of the Surface Mining Conservation and Reclamation Act, as amended, and §§87.119 or 88.107 of the Department's regulations, and

2. Shows clearly and convincingly that he or she intends to permanently abandon all uses for which he or she is presently utilizing the water supply or has already done so.

The "Abandonment of Water Supply Agreement" (Appendix E) must be executed between the operator and everyone with an ownership interest in the water supply and recorded against the deed for the property. All agreements must be recorded. All agreements shall be reviewed by Department regional litigation attorneys prior to approval.

In general, abandonment agreements only apply to circumstances where the water supply owner is abandoning the property or because there are other adequate water supplies on the property and the supply being abandoned is unnecessary.

Appendix A
Sample Notice Letter

To:

Re: Potential Impacts on Your Water Supply Source
Applicant Name
Permit Application #
Twp. Co.
Address
Telephone #

Dear :

The surface mining operator identified above has applied for a surface coal mining permit.

Based on our review of this application, we believe that the proposed mining activities could affect your water supply. Under the mining laws of Pennsylvania it is permissible for a coal operator to affect a water supply; however, the mine operator must show that an alternate water source of similar quantity and quality is available, and, in the event that your supply is affected by the mining activities, the mine operator must replace your supply.

This operator has identified an alternate water supply source as _____ _____ and has proposed to replace your existing supply at their expense should the loss actually occur.

In the event that your water supply is contaminated, diminished, interrupted, or completely lost, you may contact (operator) directly at (operator name, contact person, address, phone #), or contact the (District Mining Office and contact person) at (address, phone #).

A copy of this permit application is available for public inspection at _____ _____ or at our District Mining Office. Should you wish to visit our office and discuss this matter with our staff personally, please feel free to contact me to arrange an appointment. If you have any further questions concerning this matter, please contact this office on or before _____.

Sincerely,

bcc: permit file

Appendix B
Adequate Quantity of Replacement Water Supplies

A. Replacement Supply Quantity

Section 4.2(f) of the Surface Mining Conservation and Reclamation Act (SMCRA) provides that a replacement water supply must be "adequate for the purposes served by the supply." Therefore:

1. Unless everyone with an ownership interest in the water supply specifically agrees to a lesser supply, the quantity of the proposed replacement must be the same as, or greater than, the quantity of the existing supply. The only exceptions are when the yield of the existing supply cannot be determined or when the quantity of water available from the existing supply is substantially greater than the user would require for any reasonably foreseeable purpose. In these cases, the operator may demonstrate that the proposed alternate supply provides for the greatest reasonably foreseeable quantity of water required for the user's purpose.

2. The yield of a replacement water supply must be 5 gpm (31.54×10^{-2} dm^3/s) or greater, with the following two exceptions: (a) When the existing supply (as determined under premining conditions) yields less than 5 gpm, the proposed alternate water supply must, at a minimum, equal the premining yield of the original supply provided that it is similarly constructed. (b) If an existing supply yields more than 5 gpm, e.g. 25 gpm (157.72×10^{-2} dm^3/s) and the larger yield is required to meet the purposes served by the supply, e.g., agricultural uses, animal husbandry, commercial purposes, then a 5 gpm replacement is not adequate.

3. Water storage systems may only be considered where the replacement supply yield is 4 gpm (25.24×10^{-2} dm^3/s) or greater, and would be evaluated on a case-by-case basis for supplies with withdrawal rates greater than 5 gpm ((31.54×10^{-2} dm^3/s). Replacement water supplies which are not adequate in yield cannot be made acceptable by adding storage systems without written consent of everyone with an ownership interest in the water supply in the form of a properly executed acceptance agreement for a lesser supply. Water supplies which utilize low yielding wells require storage systems and should be considered as unreliable supplies because they are susceptible to drought or chemical and biological fouling. Storage system supplies generally require greater maintenance of plumbing fixtures, and treatment for bacteria.

In the case of a well of lesser yield than the original supply, the Department assumes that a replacement yield of 5 gallons per minute (gpm) ((31.54×10^{-2} dm^3/s) is generally adequate for domestic water supplies. The replacement yield varies for other uses (e.g. agricultural, commercial). This guidance recommends using the EPA "Manual of Individual and Non-public Water Supply Systems" (1991), EPA 570/9-91-004, to assist in determining the minimum quantity required. However, while the EPA manual is useful to estimate average water consumption rates and peak use rates, it is difficult to translate these figures into a well yield replacement.

In arriving at the 5 gpm figure, the Department considered typical well yields in the coal-bearing rock units of western Pennsylvania and representative counties outside the coal fields, per capita water consumption rates, peak demand requirements, and reliability requirements.

Typical Well Yields

The Pennsylvania Bureau of Topographic and Geologic Survey, in cooperation with the United States Geologic Survey, maintains a database of water well information (Ground Water Site Inventory, GWSI). This database was queried with regard to reported yields for wells within the bituminous coal field of Pennsylvania. This data gives an indication of typical yields for the bituminous coal region. The data is summarized in Table 1.

TABLE 1.
WELL YIELD SUMMARY FOR BITUMINOUS COAL MEASURES IN PENNSYLVANIA

	Number of Wells	Mean Yield gpm	Median Yield gpm	Q25* gpm	Q75* gpm
Allegheny Group					
All Wells	507	18.1	10	5	20
Domestic	410	13.4	10	5	20
Conemaugh Group					
All Wells	665	20.6	10	5	20
Domestic	488	11.1	8	4	15
Monongahela Group					
All Wells	101	10.9	4	1.4	12
Domestic	70	8.8	3	1.4	10
Dunkard Group					
All Wells	192	8.3	4	2	10
Domestic	153	7.7	4	2	10

*Q25 is the "lower quartile." Seventy-five percent of values are equal to or higher than this value.
Q75 is the "upper quartile." Seventy-five percent of values are equal to or lower than this value.

Well yields for western Pennsylvania's bituminous coal field are subdivided into four rock units (Allegheny, Conemaugh, Monongahela, and Dunkard Groups). Most bituminous surface mining occurs in the Allegheny Group associated with the Brookville, Clarion, Kittanning and Freeport coals. The median domestic well yield in the Allegheny Group is 10 gpm ($63.09 \times 10^{-2} dm^3/s$). The median yields of domestic wells in the Conemaugh, Monongahela, and Dunkard Groups are 8, 3 and 4 gpm (39.80×10^{-2}, 18.93×10^{-2} and $25.24 \times 10^{-2} dm^3/s$), respectively. While the data does not mean that one can universally obtain such well yields (in fact, it may be impossible in areas that are dewatered by underlying deep mines or which are located on hilltops with very little fracturing of the bedrock or limited recharge areas), it clearly indicates that well yields in excess of 5 gpm ($31.54 \times 10^{-2} dm^3/s$) are common. It also suggests that most drillers attempt to develop wells with yields of 5 gpm or greater, by drilling until they get 5 gpm or more. For example, if the first producing zone produces 3 gpm, the driller will in all likelihood continue drilling until other producing zones are encountered, so that the total is 5 gpm or greater.

If data on a specific formation is needed, the Pennsylvania Bureau of Topographic and Geologic Survey should be contacted at the Bureau of Topographic and Geologic Survey, Evangelical Press Building, 3rd and Reilly Streets, P.O. Box 8453, Harrisburg, PA 17105-8453.

Water Usage Requirements

A family of four, each using 150 gallons (567.81 dm^3) of water per day, would in theory only require a well with a yield of 0.5 gpm ($3.15 \times 10^{-2} dm^3/s$). Actual requirements greatly exceed this owing to peak demands, varying usage rates, seasonal yield variations, and demands for lawn and garden irrigation, swimming pools, and other uses. The EPA "Manual of Individual and Non-public Water Supply Systems" (1991) provides recommended guidelines for water usage.

B. Determining Adequate Supply Yield

Determining the quantity of an existing water supply or of a suggested replacement supply has historically proven much more problematic than determining quality. Quantity measurements typically require several hours to perform, are expensive and an inconvenience to the water supply user. Methods for performing quantity tests on private water supplies are not standardized and sometimes not easily interpretable. When determining which supplies require quantity testing, the Department will exercise discretion and consider the costs and difficulties associated with performing quantity tests.

However, permit applicants must be aware that, under the rebuttable presumption provisions of Section 4.2(f) of SMCRA, a mine operator is presumed, as a matter of law, to be responsible for diminution of a water supply within 1000 feet (304.8 m) of his operation, unless one of the five exceptions stated in SMCRA exist. Without a premining, baseline quantity test, the permittee may not be able to demonstrate they did not cause the diminution of a supply. The permittee's failure to collect quantity data is not a legal defense under the rebuttable presumption provisions unless the water supply owner refused reasonable access to the supply.

Well Yield

Well yield is a term frequently misused and abused in the context of water supply replacement. Well yield is defined as the maximum pumping rate that can be sustained by a well without lowering the water level in the well below the pump intake.

The following section discusses some methods for determining the quantity of a private water supply. Other methods, such as the step-drawdown test, may be acceptable on a case-by-case basis; however, it is the responsibility of an applicant for a permit to demonstrate that the test method produces accurate, reproducible results that can be used to compare water supplies in a meaningful way. The applicant is advised to contact the DMO prior to conducting the test to avoid wasting resources on unacceptable test methods.

When comparing the performance of two wells, or one well at two different times, the term "yield" is essentially meaningless unless the defining parameters are presented and understood. For instance a well driller's "blown yield" is not the same as a measurement of how much water comes out a faucet, neither of which can be compared to a specific capacity test. Nor can two specific capacity tests performed under different conditions be meaningfully compared. When tests are being used to compare two different water supplies or to compare the performance of one water supply at two different times, it is critical that the tests be duplicated as nearly as possible. For example, it is not valid to compare the results of a specific capacity test conducted for twenty minutes at a discharge rate of 10 gpm ($63.09 \times 10^{-2} dm^3/s$) to one conducted for two

hours at a discharge rate of 2 gpm ($12.62 \times 10^{-2} dm^3/s$). Tests should be reproducible through the use of standard equipment. The conditions of the well quantity test must be recorded in detail and presented along with the test results.

Water Supply Survey

Applicants need to provide a water supply survey that includes the physical attributes of the water supply provided in Module 8.2(A)(5) (depth, width, casing length, pump setting, etc.) and the following:

- The date of the test.
- Recent climatic conditions and their influence, if known, relative to the type of supply. For instance, recent heavy precipitation may have an influence on a well recharged from a shallow aquifer system.
- The time and approximate quantity of any domestic water usage in the 12 to 24 hours before the test. The supply user should curtail usage of the well prior to the test. It is best if the well is fully recovered from any previous drawdown prior to the start of the test.
- Duration of the test.
- Discharge rate measured at numerous intervals during the test. The discharge rate should be held constant throughout the test (unless, a step-drawdown test is being performed) to the extent possible. Discharge measurements should be taken every 5 minutes during the initial stages of the test and then every 10 minutes for the duration of the test. The discharge rate should be the highest rate that can be sustained for the length of the test (e.g., two hours for specific capacity tests) without drawing the water level below the pump intake.
- Remarks on the appearance of the water and measurements of field parameters, including pH, temperature and specific conductivity. This type of data will aid in determining the aquifer system or multi-aquifer systems.
- A chemical analysis of water collected near the end of the pumping test.
- Frequent water level measurements (at 1 to 2 minute intervals for the first 10 to 20 minutes of the test), especially during the start of the test and/or during periods of rapid drawdown. Thereafter, water level measurements should be taken at 5 minute intervals for the duration of the test. Water level measurements to determine the capacity of a well should be continued until the water level has stopped or practically stopped lowering.
- The recorded times of all measurements.
- Measurements of the recovery rate of the water level in the well after the pump is shut down. These measurements should be taken until the water has returned to, or nearly to, its original level.
- When nearby wells are available for observation purposes, the depth of water in them should be measured periodically. However, at the low pumping rates of short duration yield tests normally used on domestic water supplies, it will be unusual to witness any effect at nearby wells unless the wells are within a few feet (meters) of the pumping well. When drawdown at nearby wells is observed, water level data from the nearby wells can give an idea of how large an area will be affected by pumping and aid in determining the characteristics of the water-bearing formation.

C. Types of Tests

Specific Capacity

The "specific capacity" of a well is the number of gallons of water produced per minute for each foot of well drawdown. (Editor's note: Specific capacity does not have a recommended SI unit of measure. While specific capacity may be converted into cubic decimeters per meter, those units of measure have not been included in this discussion for the sake of clarity.)

Well yield can be calculated by multiplying the available drawdown in the well (the distance between the static water level and the normal pump setting in feet) with the specific capacity (units in gallons per minute per feet of drawdown), the result having the units of gallons per minute (gpm). This calculated yield takes into consideration both the storage capacity of the well and the aquifer performance under the limited conditions of the specific capacity test. Since pumping rate and the test duration both affect the specific capacity, they need to be nearly the same to compare results of two tests either between different wells or on the same well at different times. Seasonal variations of a well's recharge can influence yield.

The duration of a specific capacity test is often dictated by practical considerations such as how long the well users are willing to tolerate an interruption in their supply, or how quickly the well goes dry. The test duration of a domestic water supply should be developed to simulate the typical usage stresses. A test duration of 1 to 3 hours at a pumping rate of 5 gpm ($31.54 \times 10^{-2} dm^3/s$) should suffice to simulate most household conditions. The test duration may be limited by some of the characteristics of the well that are mentioned above. When using the existing, in-place water supply pump, a discharge rate of 5 gpm minute may not be obtainable. Well plumbing fixtures, such as the pressure shutoff switch, sediment filter and pressure tank may need to be by-passed or disconnected to maintain a stable, steady pumping rate. The test should be terminated when the water level drops within 5 ft (1.5 m) of the pump, so the pump is not damaged by running it dry.

Well storage becomes overemphasized in short-duration specific capacity tests. Unlike a long-duration test of a high-performance, industrial well, a short-duration test of a low-yielding well, especially a deep well, may result in borehole storage water representing most of the water discharged during the test. A borehole storage problem becomes significant if the specific capacity is then multiplied by the available drawdown to calculate a yield. A poor-performing, unreliable well can appear to have a relatively good yield when an inappropriate test method is used. There are two ways to avoid this problem. First, compare specific capacities (without borehole storage) and do not calculate a yield. This approach completely eliminates consideration of borehole storage. The second approach allows well storage to be considered but not overemphasized by subtracting the volume of borehole storage from the amount of water discharged prior to calculating specific capacity, then calculating the well yield. This second approach gives credit for borehole storage, but does not count it twice. An applicant who objects to discounting the water removed from storage before calculating a yield has the option of conducting a long-duration pump test (~72-hour test) at a pumping rate that is high enough that borehole storage would become insignificant.

SC=R/D
Where: **SC** = specific capacity (gpm/ft), **R** = adjusted discharge rate (gpm), and **D** = total drawdown (ft.)

R = (Vt - Vs) / t
Where: **Vt** = total volume of water discharged during test (gallons), **Vs** = volume of water discharged from borehole storage (gallons), and **t** = duration of the test (minutes).

Vs = 23.5**D r**^{2}
Where: **Vs** = volume of water discharged from borehole storage (gallons), **D** = total drawdown (feet)**, r** = well radius in feet.
(Note, for a standard $6^1/_2$ inch diameter well, **Vs** = 1.72 gal./ft. X **D**)

Safe Yield (gpm) = AD x SC x (safety factor)
Where: **AD** = available drawdown (ft) = depth to pump intake - static water level - 5 ft.

A **safety factor** is employed in the safe yield formula as compensation for short-duration specific capacity tests which do not consider the extent to which yield will decrease if the well is pumped for periods longer than the test period and for the effect of seasonal or regional water level fluctuations which deviate from that which existed at the time of the test. Safety factors of 0.9 and 0.75 are utilized for tests conducted between July - November and December - June, respectively.

Peak Demand Test

The Peak Demand Test (PDT) is sometimes used by lending institutions to verify that a property being sold has a water supply of adequate yield. The test is used to simulate well usage during peak demands, and does not provide an actual yield value. It only tests a delivery system's ability to provide water to the user. The test is performed by running the water at a set rate for 15 minutes and then allowing the well to recover for 15 minutes. The on/off pumping cycles are repeated for 4 hours or until the well fails, whichever comes first. For the purpose of this test, a well is said to fail when the pump intake breaks suction and the discharge rate drops noticeably. The time when the well fails is recorded and this time can then be used to compare the performance of different wells and the same well at different times. The discharge rate must be recorded frequently during the test, and should be measured at least every 5 minutes (three times per pumping cycle).

The parameters of the PDT must be carefully recorded, and when two tests are being used for comparative purposes, they must duplicate one another as nearly as possible. For example, if the test is going to be used to compare the performance of two wells, then the discharge rates for the two wells must be nearly identical during the test. If not, the wells have not undergone the same stress and the results cannot be compared in a meaningful way. Maintaining a constant discharge rate can be difficult to achieve, an in-place water delivery system for a home can be difficult to control and the discharge rate may decline as the test advances.

If the PDT is being used to establish background conditions on one well, rather than for comparative purposes, the discharge rate used should be as close to 5 gpm (31.54×10^{-2} dm^3/s) as possible to adequately stress the well. The water supply system in place may limit the maximum, obtainable discharge rate. Also, the discharge rate cannot vary significantly during

the test. PDTs conducted at low or variable discharge rates are not acceptable for establishing the background quantity of a supply, because a meaningful comparison to a replacement supply cannot be made.

Because the PDT does not require entry to the well bore, liability concerns from well damage are less. The test also provides a means of testing water supplies not physically accessible for water level measurements. A disadvantage of the test is that the PDT takes longer to perform than the short-duration specific capacity test. Because of the on-and-off cycles, the PDT will not adequately test the well if its duration is shortened to less than 4 hours. The PDT should only be allowed where borehole access requires an extraordinary effort.

Quantity Tests for Springs

The quantity of an undeveloped spring can be easily determined by measuring the discharge flow rate by some reliable method such as a calibrated container with stop watch or a narrow notched weir. Undeveloped springs should be measured during the seasonal low flow period of July, August and September.

Determining the quantity of water available from a developed spring can be more difficult. Measuring the overflow discharge of a developed spring is generally not an accurate measure of spring quantity. Frequently, springs are developed in such a way that water can both leave and enter the spring box through the bottom and sides, so that even very reliable springs may have little or no overflow from a reservoir. The quantity of a developed spring can be reliably measured directly from the overflow pipe, only if the spring is developed so that the entire flow of a spring is captured and piped into a watertight reservoir, such as a steel or concrete tank, and all flow to and from the tank is measured. Peak Demand Tests and specific capacity tests can sometimes be modified to test springs, depending on the construction of the spring containment structure.

5600-FM-BMP0451 12/2013

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING PROGRAMS

DEPARTMENT USE ONLY
License No. _____
Permit No. _____

COST COMPARISONS AND BOND CALCULATION FOR EXISTING AND REPLACEMENT SUPPLIES

Residence: _____ Operator: _____
Previous Water Supply: _____ SMP Application: _____
Monitoring Point I.D.: _____ Twp.: _____
Replacement Supply: _____ County: _____
Number of Occupants: _____ Reason for Replacement: _____
Current Uses: _____ Foreseeable Uses: _____

INSTALLATION COSTS

	Existing System	Replacement System

1. Cost of drilling

Itemize below:

Existing:

Replacement:

Subtotal $_____ (1a) $_____ (1b)

2. Cost of well / spring containment / municipal connection
Including casing, piping of water system to residence, and labor, itemize below:

Existing:

Replacement:

Subtotal $_____ (2a) $_____ (2b)

3. Cost of water system
Including pump, pump riser pipe, well cap, pressure tank, and labor, itemize below:

Existing:

Replacement:

Subtotal $_____ (3a) $_____ (3b)

4. Cost of treatment and/or conditioning system
Including labor for installation, itemize below:

Existing:

Replacement:

Subtotal $_____ (4a) $_____ (4b)

5. Total cost for entire system
(add lines 1, 2, 3, and 4) Total $_____ (5a) $_____ (5b)

OPERATION AND MAINTENANCE COSTS

Maintenance Costs

		Existing System	Replacement System
6.	**Annual maintenance of entire system** Estimated at 2% of the cost of the entire system (multiply line 5 by 2% (0.02))	$_____ (6a)	$_____ (6b)
7.	**Annual replacement cost of water system** Estimated at 8% of cost of the water system, 12 year life (multiply line 3 by 8% (0.08))	$_____ (7a)	$_____ (7b)
8.	**Annual replacement cost of treatment system** Estimated at 8% of cost of the treatment system, 12 year life (multiply line 4 by 8% (0.08))	$_____ (8a)	$_____ (8b)

Operating Costs

		Existing System	Replacement System
9.	**Calculate the cost of electricity required for pumping** Provide documentation on how the costs were determined, Volumes should correspond to volumes used in Public Water Supply Calculations. The following formulas may be used: (Gals. used/day _____ /pump capacity in gpm _____) x (365 days /yr.) / (60 min./hr.) = _____ hours pumped/year Hours pumped/year _____ x pump hp _____ x 0.745 kwh/hph = _____ kwh/year	_____ (9a) kwh/year	_____ (9b) kwh/year
10.	**Cost per kilowatt hour** (from electric company)	$_____ (10) /kwh	
11.	**Annual power costs** (multiply lines 9 and 10)	Subtotal $_____ (11a)	$_____ (11b)
12.	**Annual cost of chemical needs** When a treatment system is needed, itemize below: Existing: Replacement:	Subtotal $_____ (12a)	$_____ (12b)
13.	**Total annual maintenance and operating costs** (add lines 6, 7, 8, 11, and 12)	Total $_____ (13a)	$_____ (13b)

MONTHLY COST OF WATER FROM PUBLIC WATER SUPPLY SYSTEM

Calculation of Water Usage

14. Average usage per day per person _____ (14) gallons/day

15. Number of members in household _____ (15)

16. Average total daily usage of water
For household members (multiply lines 14 and 15) _____ (16) gallons/day

17. Daily water usage for livestock
Specify type and number of livestock and estimated water usage for each in space below:

_____ (17) gallons/day

18. Daily water usage for other purposes
Periodic usage not accounted for on lines 16 and 17, including lawn and garden watering, car washing, guest accommodations, swimming pool, etc. Specify type of use, total amount used and convert to daily amount:

_____ (18) gallons/day

19. Total average daily water usage
(add lines 16, 17, and 18) _____ (19) gallons/day

20. Calculate average monthly usage
(multiply line 19 by 30.0) _____ (20) gallons/month

21. If monthly usage varies, calculate low, medium and high
average monthly usage pattern for the household

Low usage (Line 20 x 0.5): _____ (21a) gallons
Medium usage (Line 20): _____ (21b) gallons
High usage (Line 20 x 1.5): _____ (21c) gallons

Public Water Company Usage Rates

22. Fixed charge per month for a residence
When applicable ($_____ x 12.0, go to line 38) $_____ (22)

23. Volume charge for first _____ (23a) gallons $_____ (23b)

for next _____ gals. $_____ (23c) 1000 gallons/month
for next _____ gals. $_____ (23d) 1000 gallons/month
for next _____ gals. $_____ (23e) 1000 gallons/month
for usage over _____ gals. $_____ (23f) 1000 gals/month

CALCULATION OF YEARLY HOUSEHOLD WATER BILL

If water usage is relatively constant throughout year, start on line 24.
If water usage varies during the year, skip to line 29.
If water usage is determined from monthly water bills, skip to line 34.

24. **Determine volume, water usage is relatively constant**
Throughout the year (subtract 23a from 21b) _____ (24) gallons/month

25. **Calculate volume charge** (based on gallons in line 24
And the usage rates in lines 23c, d, e, f) $_____ (25)

26. **Calculate monthly water bill**
(add line 23b to line 25) $_____ (26)

27. **Calculate yearly water bill constant usage**
(Multiply line 26 by 12.0, go to line 38) $_____ (27)

29. **Determine volumes, water usage varies widely from month to month**
(Low, Subtract 23a from 21a) _____ (29a) gallons/month
(Medium, Subtract 23a from 21b) _____ (29b) gallons/month
(High, Subtract 23a from 21c) _____ (29c) gallons/month

30. **Calculate volume charge** (based on gallons in lines
29a, b, c and the usage rates in line 23c, d, e, f)
(Low) $_____ (30a)
(Medium) $_____ (30b)
(High) $_____ (30c)

31. **Calculate variable monthly water bills.**
Low (add line 23b to line 30a) $_____ (31a)
Medium (add line 23b to line 30b) $_____ (31b)
High (add line 23b to line 30c) $_____ (31c)

32. **Calculate variable periods of water bills.**
Months of low usage _____ x line 31a $_____ (32a)
Months of med. usage _____ x line 31b $_____ (32b)
Months of high usage _____ x line 31c $_____ (32c)

33. **Calculate yearly water bill variable usage**
(add lines 32a, 32b, and 32c, go to line 38) $_____ (33)

34. **Water usage from monthly bills**
Number of months used, (minimum 6 months) _____ (34) months

35. **Total of monthly water bills** $_____ (35)

36. **Average monthly water bill**
(divide line 35 by line 34) $_____ (36)

37. **Calculate yearly water bill from monthly bills**
(multiply line 36 by 12.0, go to line 38) $_____ (37)

COST CALCULATION SUMMARY COST INCREASE DETERMINATION

38. Yearly public water bill
(from lines 22, 27, 33, or 37) $_____ (38)

39. Maintenance cost of hookup to public water supply
(from line 13b) $_____ (39)

40. Annual cost of public water supply
(add lines 38 and 39) $_____ (40)

41. Annual operation and maintenance cost of replacement supply
Not public water supply, (from line 13b) $_____ (41)

42. Annual operation and maintenance cost of existing supply
(from line 13a) $_____ (42)

43. Annual cost difference
(subtract line 42 from line 40 or line 41,
if line 43 is greater than zero proceed to line 44) $_____ (43)

BOND CALCULATION SUMMARY

44. Average annual inflation rate for previous 5 year period (decimal)
(published in the Pennsylvania Bulletin) _____ (44)

45. Determine bonding period
(add 1 to the number of years until permit renewal) _____ (45)

46. Calculate annual cost difference at the end of the permit term plus one year
(multiply line 43 by (1.00 plus line 44)$^{\text{line 45}}$) $_____ (46)

47. Average interest rate on the 20-year Treasury bill for the previous 5 years (decimal)
(published in the Pennsylvania Bulletin) _____ (47)

48. Calculate multiplier
(divide (line 47 minus line 44) by (1.0 plus line 44)), (minimum 0.01) _____ (48)

49. Calculate the bond amount
(divide line 46 by line 48) $_____ (49)

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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CONSENT TO LESSER WATER SUPPLY AGREEMENT

Directions: This form should be used when the water supply owner is willing to consent to a lesser water supply as part of a settlement between the parties concerning a water supply that will be, or has been, affected by surface mining activities. Aside from lower quality or quantity of water, a replacement water supply that results in increased operation and maintenance costs for the supply owner is considered a lesser water supply. There is a separate instruction sheet for this form which should be reviewed prior to signing.

In addition to generally applicable terms set forth in 1 to 8 and 9 to 12, this agreement contains four internal sections which address the specific aspects of a lesser water supply: I. Lesser Quantity or Quality of the Replacement Water Supply; II. Increased Operation and Maintenance Costs; III. Reduction in Access to or Control over the Replacement Water Supply; and IV. Excessive Maintenance, or Less Reliability or Permanence, for the Replacement Water Supply. All of these sections may not be applicable to the water supply covered by this agreement.

Each applicable section (I-IV) must be separately executed by the water supply owner(s), in addition to execution of the entire agreement by the parties. Those sections which are not applicable must be initialed by all parties to indicate their agreement that the section is not applicable to the Original Water Supply. Inapplicable sections should not be completed. Wording in brackets should be circled as appropriate to describe the water supply covered by this agreement.

Operator:

Name: _____ Address: _____

Water Supply Owner(s): List everyone with an ownership interest in the Original Water Supply.

Name: _____ Name: _____

Address: _____ Address: _____

1. The operator has [proposed to min / mined] at the _____ mine in _____ Township, _____ County, [Permit Application] No. _____.

2. The Original Water Supply is a _____ (*describe nature of Original Water Supply, e.g., spring, well*). The Original Water Supply is identified as sample point _____ in the permit application.

3. Water quality and quantity analyses of the Original Water Supply are attached as Exhibit A and incorporated into this agreement. Median values are as follows (*identify units of measure*):

Date	Flow/ Yield	PH units	Alk mg/l	Acid mg/l	Fe mg/l	Mn mg/l	Al mg/l	SO_4 mg/l	TSS mg/l	Other

4. The purpose(s) served by the Original Water Supply is/are _____ (*describe original* purposes*, e.g., domestic, agricultural, industrial*).

5. The Operator's surface mining operations [may impact / have impacted] the Original Water Supply through contamination, interruption or decrease of the supply.

.

6 By signing this consent form, the water supply owner understands and acknowledges that the Surface Mining Conservation and Reclamation Act (the Act), 52 P.S. §1396.1 et seq., and the rules and regulations of the Department require the following:

(i) A surface mining operator must restore or replace a water supply if the operator's mining activities cause contamination, interruption, or a decrease of that water supply;

(ii) A surface mining operator must restore or replace an affected water supply at the operator's expense;

(iii) The replacement water supply must be of adequate quantity and quality for the purposes served by the original water supply;

(iv) The operator must pay the water supply owner for all operation and maintenance costs of the replacement water supply that exceed the operation and maintenance costs of the original water supply;

(v) The water supply owner access to and control over the replacement water supply must be equivalent to the access and control the water supply owner had over the original water supply.

(vi) A replacement water supply cannot require excessive maintenance, or be less reliable or less permanent than the original affected water supply;

7. The Operator has [proposed to replace / already replaced] the Original Water Supply with a Replacement Water Supply described as follows: _____.
the Replacement Water Supply

8. The Replacement Water Supply will be a lesser water supply as compared to the Original Water Supply in the following ways: (*check all that apply and complete the appropriate sections I to IV)*

☐ The replacement supply is of lesser chemical quality or lower quantity than the original water supply;

☐ The replacement supply will result in increased operation and maintenance costs for the owner;

☐ The replacement supply will result in less access or control than the original water supply;

☐ The replacement supply will require excessive maintenance, will be less reliable, or will be less permanent than the original water supply

Section I must be completed if the replacement supply is lesser in chemical quality (e.g., higher iron content), or in quantity (e.g., decreased flow), when compared to the Original Water Supply. If Section I does not apply to the water supply, the following statement must be initialed by all parties to this agreement:

I (we) have read the entire contents of Section I and agree that Section I does not apply to the water supply covered by this agreement.

_____ **(Water Supply Owner(s))**

_____ **(Operator)**

Section I. Lesser Quantity or Quality of the Replacement Water Supply

I-1 The quality and quantity of the Replacement Water Supply without treatment will meet the following parameters (representative values are shown for alkalinity, acidity, iron, manganese, aluminum, sulfate and total suspended solids. The pH may be represented by a range; flow is a minimum value; units are in mg/l unless otherwise noted):

Flow/ Yield	PH units	Alk mg/l	Acid mg/l	Fe mg/l	Mn mg/l	Al mg/l	SO_4 mg/l	TSS mg/l	Other

I-2. The parties have agreed that the operator [will / will not] install at its own expense a treatment system for the Replacement Water Supply which will consist of the following:

_____

I-3 If a treatment system is being installed, the treated quality of the Replacement Water Supply will be as follows (representative values are shown for alkalinity, acidity, iron, manganese, aluminum, sulfate and total suspended solids. The pH may be represented by a range; flow is a minimum value; units are in mg/l unless otherwise noted):

Flow/ Yield	PH units	Alk mg/l	Acid mg/l	Fe mg/l	Mn mg/l	Al mg/l	SO_4 mg/l	TSS mg/l	Other

I-4 In order to improve diminished quantity or quality, the Replacement Water Supply will include the following components which were not part of the Original Water Supply (e.g. storage tank to supplement low yield source, an RO treatment unit):

_____

_____

BY THE WATER SUPPLY OWNERS (Please read carefully):

I voluntarily and knowingly waive my legal right to a Replacement Water Supply adequate in quantity and chemical quality to serve the purposes of the Original Water Supply according to applicable law, and I agree to accept a Replacement Water Supply of lesser quality and/or quantity as described in this section I.

(Provide signatures of everyone with an ownership interest in the water supply.)

Name: Date	Name Date
Name: Date	Name Date

Section II must be completed if the operation and maintenance costs of the replacement supply are more than the operation and maintenance costs of the Original Water Supply. If Section II does not apply to the water supply, the following statement must be initialed by all parties to this agreement:

I (we) have read the entire contents of Section II and agree that Section II does not apply to the water supply covered by this agreement.

_____ **(Water Supply Owner(s))**

_____ **(Operator)**

Section II. Increased Operation and Maintenance Costs

II-1 If the operation and maintenance costs of the Replacement Water Supply exceed the operation and maintenance costs of the Original Water Supply, the operator is required by law to permanently pay the water supply owner for the increase in these costs.

II-2 The annual increase in operation and maintenance costs associated with the Replacement Water Supply [has been calculated as / is projected to be] the amount of $ _____ per year.

II-3 The operator and the water supply owner(s) have agreed to a settlement with respect to all increased operation and maintenance costs of the Replacement Water Supply. The parties' settlement of the operator's obligation to pay increased operation and maintenance costs provides for one of the following: *(check those that apply)*

☐ the operator has made a lump sum payment to the water supply owner(s) as satisfaction for the operator's obligation to permanently pay the increased operation and maintenance costs;

☐ the water supply owner(s) have agreed to take full responsibility for any increase in the operation and maintenance costs associated with the Replacement Water Supply; or

☐ operation and maintenance costs will be addressed by the following method: *(describe in detail)*

_____

_____

BY THE WATER SUPPLY OWNERS (Please read carefully)

I am voluntarily and knowingly executing this agreement and, in exchange for consideration rendered, I hereby release the operator of any further obligation to pay the increased operation and maintenance costs for the Replacement Water Supply.

(Provide signatures of everyone with an ownership interest in the water supply.)

Name:	Date	Name	Date
Name:	Date	Name	Date

Section III must be completed if the replacement supply does not provide the water supply owner with the same degree of access or control when compared with the Original Water Supply. If Section III does not apply to the water supply, the following statement must be initialed by all parties to this agreement:

I (we) have read the entire contents of Section III and agree that Section III does not apply to the water supply covered by this agreement.

_____ **(Water Supply Owner(s))**

_____ **(Operator)**

Section III. Reduction in Access to or Control Over the Replacement Water Supply

III-1. The Replacement Water Supply [provides / will provide] the owner(s) of the Original Water Supply with less access or control than the owner(s) possessed with the Original Water Supply in the following manner: (*describe the characteristic resulting in lesser access or control)*

_____

_____

BY THE WATER SUPPLY OWNERS (Please read carefully):

I voluntarily and knowingly waive my legal right to the same degree of access and control associated with the Replacement Water Supply as compared with the Original Water Supply, as described in this section III.

(Provide signatures of everyone with an ownership interest in the water supply.)

Name:	Date	Name	Date
Name:	Date	Name	Date

Section IV must be completed if the replacement supply requires excessive maintenance, is less reliable, or is not as permanent, when compared with the Original Water Supply. If Section IV does not apply to the Original Water Supply, the following statement must be initialed by all parties to this agreement:

I (we) have read the entire contents of Section IV and agree that Section IV does not apply to the water supply covered by this agreement.

_____ **(Water Supply Owner(s))**

_____ **(Operator)**

Section IV. Excessive Maintenance, or Less Reliability or Permanence, for the Replacement Water Supply

IV-1. The Replacement Water Supply requires excessive maintenance, is less reliable, or is less permanent, when compared with the Original Water Supply, in the following manner: *(describe specifics e.g., metal concentrations so high as to likely necessitate unusually frequent repairs or replacement; yield is so low that periodic interruptions of water supply are likely; replacement supply includes components not typically found on private water supplies likely requiring unusual maintenance)*

_____

_____

_____

_____

IV-2. The operator and the owner(s) of the Original Water Supply have agreed to a settlement for any excessive maintenance, lesser reliability, or less permanence, required for the Replacement Water Supply as follows: *(describe the terms of settlement with respect to excessive maintenance, lesser reliability or lesser permanence)*

_____

_____

BY THE WATER SUPPLY OWNERS (Please read carefully):

I voluntarily and knowingly waive my legal right to a Replacement Water Supply which does not require excessive maintenance, is less reliable, or is less permanent as described in this section.

(Provide signatures of everyone with an ownership interest in the water supply.)

Name: Date	Name Date
Name: Date	Name Date

9. The deed for the property, on which the Original Water Supply is situated, is recorded in Book No. _____ Page No. _____ in _____ County.

10. This agreement shall be governed by, construed, interpreted and enforced in accordance with the laws of the Commonwealth of Pennsylvania.

11. Any modification or amendment to the terms and provisions of this Agreement shall be valid and effective only if made in writing and duly executed on behalf of the parties hereto.

12. All of the covenants, representations, consents, waivers, releases and agreements contained in this agreement shall be binding on and inure to the benefit of the parties and their respective heirs, successors and assigns.

BY THE WATER SUPPLY OWNERS (Please read carefully):

The water supply owner signatories above warrant that they are the only current owners of the Original Water Supply and that they are authorized to enter into this Consent to Lesser Water Supply Agreement.

With the intent to be legally bound and in exchange for consideration rendered I am voluntarily and knowingly executing this Consent To Lesser Water Supply Agreement in which I am settling and waiving my legal rights with respect to a replacement water supply adequate in quantity and quality for the purposes served by the Original Water Supply as described in the applicable sections (I-IV) completed and executed above.

(Provide signatures of everyone with an ownership interest in the water supply.)

Name:	Date	Name	Date
Name:	Date	Name	Date

ACKNOWLEDGEMENT

STATE OF :
: ss
COUNTY OF :

On this, the _____ day of _____, 20_____ , before me, the undersigned Notary, personally appeared

_____
(Name (s))

known to me (or satisfactorily proven) to be the person(s) whose name(s) is/are subscribed to this instrument, and who acknowledged that (he, she or they) have executed the same and desire it to be recorded.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

(SEAL) _____ My Commission Expires: _____
Notary Public (Date)

BY THE OPERATOR:

I hereby agree to provide a Replacement Water Supply, including the resolution of any increased operation and maintenance costs, in accordance with the terms of this Consent to Lesser Water Supply Agreement as described in the applicable sections (I-IV) completed and executed above.

_____

Name: Date
Title:

CORPORATE SEAL

_____

Name: Date
Title:

ACKNOWLEDGEMENT

STATE OF :
: ss
COUNTY OF :

On this, the _____ day of _____, 20_____ , before me, the undersigned Notary, personally appeared

_____
(Name (s))

known to me (or satisfactorily proven) to be the person(s) whose name(s) is/are subscribed to this instrument, and who acknowledged that (he, she or they) have executed the same and desire it to be recorded.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

(SEAL) _____ My Commission Expires: _____
Notary Public (Date)

* * * * * * * * * *

This instrument has been recorded in _____
County, Pennsylvania, this _____ day of _____,
_____ (year), at Book _____, Page(s) _____.

_____
(Signed) + (Print Name)

_____
(Seal)