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Cooperative Infrastructures for  
Small Water Systems:  
A Case Study

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# Cooperative Infrastructures for Small Water Systems: A Case Study

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## **Executive Summary**

Small water systems (SWS) can serve as many as 3,200 people and as few as twenty-five people, compared to large waterworks that serve thousands of people in metropolitan areas. In Virginia, more than ninety percent of water suppliers fall into this category of public “rural” SWS. In 1996, the Safe Drinking Water Act (SDWA) was amended to protect Americans from unsafe drinking water and to prevent contamination of drinking water sources. Specifically, section 1420 of the SDWA focuses on developing the financial, managerial, and technical capacities of SWS where violation of drinking water standards are prevalent. In 1997, 304 Virginia waterworks reported violations of drinking water standards, fifty-three percent of which were rural SWS.

The SDWA has authorized the United States Environmental Protection Agency (U.S. EPA) to set National Primary Drinking Water Standards (NPDWS). Larger water systems, serving over 3,200 people, have a tendency to possess the financial resources and technical skills to meet the NPDWS due to economies of scale. However, smaller water systems are not meeting SDWA standards because they lack available capital, do not retain a large volume of business, and are limited by their dispersed geographic locations. Often SWS are an auxiliary operation to another business with limited available capital, which results in the operation’s inability to comply with the NPDWS.

The overall goal of this project is to develop a conceptual cooperative structure for rural SWS and demonstrate the validity of this structure in Carroll County, Virginia. It is hypothesized that, by organizing as a cooperative, SWS in Virginia can obtain operational efficiency and meet the NPDWS through economies of scale. Specifically, the research involves a market analysis of cooperative structures which are proposed to reduce costs, optimize operational efficiency, increase revenue, increase the exchange of technical information, aid in obtaining suitable operational capacities, and therefore decrease the amount of NPDWS violations in those participating SWS.

To test this hypothesis, twelve SWS in the study area have been selected, based on certain criteria including: number of NPDWS violations, geographic proximity, population served, physical condition of facilities, and owner/operator interest. Data have been collected on each operation’s management practices, personnel resources, and technical efficiencies. Personal interviews were conducted with each SWS operator using questions from a four-part survey. The survey covered the following areas: water system characteristics; operations, management, and maintenance; cooperative management; and financial management. The data from the survey were analyzed to determine where and how these SWS can improve efficiency via economies of scale and business structure.

The results of this research will reveal the effects of a cooperative structure on a group of participating SWS in terms of business management and meeting drinking water standards. Results will be used to develop guidelines for a conceptual cooperative structure, which can be applied to SWS across rural Virginia and perhaps nationwide.

# 1. Introduction

In rural Virginia small water systems face many obstacles, primarily limited resources. These small water systems are usually auxiliary businesses, which lack appropriate financial, managerial, and technical resources. Drinking water violations are a real concern for system operators, owners, and customers. This cause for concern will be increasingly problematic as governmental regulations become more stringent.

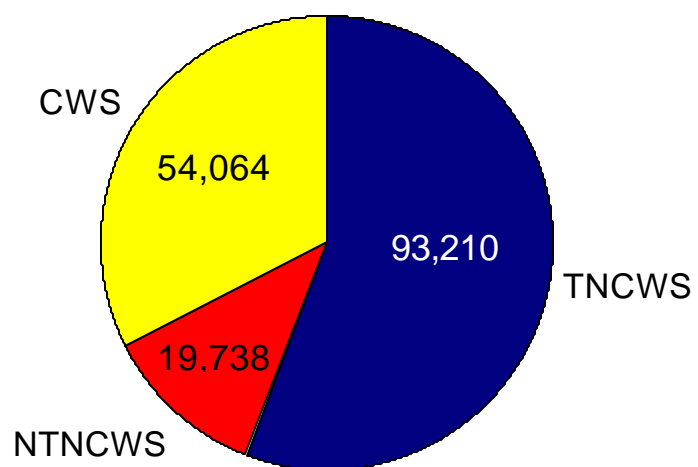
## 2. Background

### 2.1 Small Water Systems

Drinking water regulations in the United States affect water systems differently based on their type and size. A system that provides water via pipes or other constructed channels to at least fifteen service connections or serves at least twenty-five people per day for sixty days of the year is considered a public water system (7). These systems may include any collection, storage, treatment, and distribution facilities under or not under the control of an operator (1).

Public water systems are classified into three groups: community water systems, non-transient non-community water systems, and transient non-community water systems. Community water systems (CWS) are public water systems that serve the same residents year round. Examples of community water systems may include homes, trailer parks, condominiums, and/or apartments in cities or in small towns. Non-community water systems are different, because they do not serve the same people year round. There are two types of non-community water systems: non-transient and transient non-community water systems. These two classifications are based on the time that they serve the public. A non-transient non-community water system (NTNCWS) serves the same people for more than six months, but not the entire year. A good example of a NTNCWS might be a school that has its own water supply. A transient non-community water system (TNCWS) is different in that it serves different people for less than six months. A few examples are campgrounds, rest areas, service stations, visitor centers, and fire departments (7). Figure 1.1 shows a breakdown of the three categories of public water system in Virginia. The nationwide distribution is similar to the distribution of public water systems in Virginia, figure 1.2. In both cases, there are a larger number of TNCWS, followed by CWS, leaving the smallest category being NTNCWS (3).

Public water systems are often given a general classification by size (the number of people they serve) as either large or small. Small public water systems (SPWS) are defined as serving less than 3,300 people. Large public water systems (LPWS) serve more than 3,300 people. In Virginia, approximately 70% of the SPWS are investor-owned whereas only 7% of the LPWS are investor-owned (14).



**Figure 1.2. Categories of SPWS in the United States**

## **2.2 Safe Drinking Water Act**

Americans, expect clean, safe drinking water regardless location: in a public bathroom, a five star restaurant, or at the kitchen sink. To protect Americans from unsafe drinking water, Congress passed the Safe Drinking Water Act in 1974. Originally, the act was designed to ensure public safety by regulating the treatment of the nation's drinking water supply. In 1986 and again in 1996, the act was amended. The updated act includes various provisions to protect any drinking water source from potential contamination, require operator training and certification, provide a means of funding for water system improvements, and increase the availability of public information on water systems. The main idea behind the 1996 amendments was to protect drinking water "from source to tap". The Safe Drinking Water Act regulates all public water systems in the United States, however, it does not regulate private wells and/or systems that serve less than 25 individuals. To make sure that small water systems are capable of complying with the drinking water standards set by the United States Environmental Protection Agency (EPA), the 1996 amendments to the Safe Drinking Water Act give special considerations to these small systems to ensure that they have the necessary managerial, financial, and technical support. (7)

The Safe Drinking Water Act specifies that the EPA create a set of national standards for drinking water. These National Primary Drinking Water Standards must protect people from naturally occurring contaminants in drinking water as well as man-made contaminants. The standards describe ways to treat or remove contaminants from drinking water and set enforceable maximum contaminant levels to which water systems must conform. The EPA follows a three-step process when setting primary drinking water standards. First, the EPA identifies potential drinking water contaminants, studies these contaminants, studies their concentration in the water, and focuses on the contaminants that have the greatest impact on public health safety. Second, the EPA determines a maximum contaminant level for water systems. They do this while taking into consideration cost-benefit analysis and economic feasibility of detection and treatment alternatives for all sizes of water systems. Finally, the EPA formally specifies a maximum permissible level of a contaminant in drinking water. For those systems that cannot detect a specific contaminant, the EPA sets a mandatory Treatment Technique in order to prevent contamination in the specific water system (7).

## **2.3 Challenges Faced by Small Water Systems**

Small public water systems (SPWS) basically face three main challenges due to the following: the structure of the industry, economics of scale, and historical nature of the industry. The structure of the drinking water industry in the United States poses a challenge because it is essentially a rising cost industry. Water systems are not providing the same product that they provided twenty or even ten years ago. The quality of drinking water in the United States has dramatically improved. Along with this improvement in water quality are increases in costs associated with tighter regulations, more personnel for facility operation and maintenance, and the need for infrastructure improvements (8).

Economies of scale also pose a great challenge for SPWS. Unlike large public water utilities, SPWS lack a large customer base. Due to this lack of customers, SPWS are not able to generate enough revenue to pay additional technical staff, make infrastructure improvements, pay debts, or even meet all national drinking water standards set by the EPA. According to a 1997 United States EPA Drinking Infrastructure Water Needs Survey, SPWS are less likely to be able to access outside capital to finance facility improvements because they lack the cash flow, contrary to their larger counterparts (8).

The final significant challenge that SPWS face is deeply imbedded in the historical nature of the drinking water industry in the United States. Historically, the drinking water industry has been viewed as being under-priced, meaning the cost of providing service has been greater than the revenue generated from the sale of the service. The challenge SPWS face is providing affordable drinking water services, but not under-pricing the rates for that service. Rates for drinking water must be a function of the cost of providing that service and the customer's ability to pay. Finding a desirable medium between these two factors is a very difficult challenge that SPWS continue to face, which also threatens their continuation (8).

## **2.4 Hypothesis**

If small water systems are linked together in a cooperative organization, by pooling their collective resources, they can achieve the benefits of economics of scale, and therefore increase their technical/financial capacities and managerial efficiency.

## **3. Situation Analysis**

### **3.1 Case Study Location**

The target site for this case study was Fancy Gap located in Carroll County, Virginia. This small community has a population of approximately 260 people and is located adjacent to the Blue Ridge Parkway and Interstate 77. There are a total of 156 total households in Fancy Gap, Virginia (2). Many of the SPWS are located along sections of the Blue Ridge Parkway. Figure 3.1 is a map of Virginia, specifically highlighting Carroll County, where the case study is focused.

The nine SPWS selected for the case study were chosen based on several variables: size (number of connections), geographic location, number of drinking water violations, and type of system (similar customers). Three of the water systems that were added to the case study are not considered SPWS by the Virginia Department of Health, because they have fewer than fifteen connections. However, these water systems are geographically located close to the other water systems; have similar customer demographics; have similar technical, financial, and managerial concerns; and have the potential to increase their number of connections to more than twenty-five in the foreseeable future. Figure 3.2 shows the exact locations of the twelve water systems in Carroll County, Virginia.

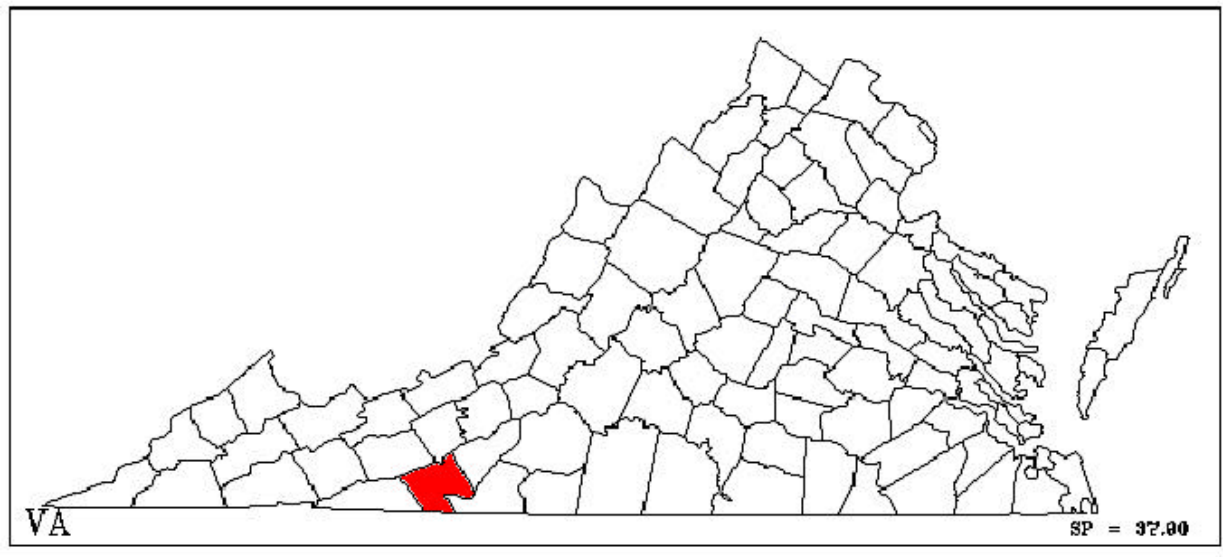


Figure 3.1. Carroll County, Virginia

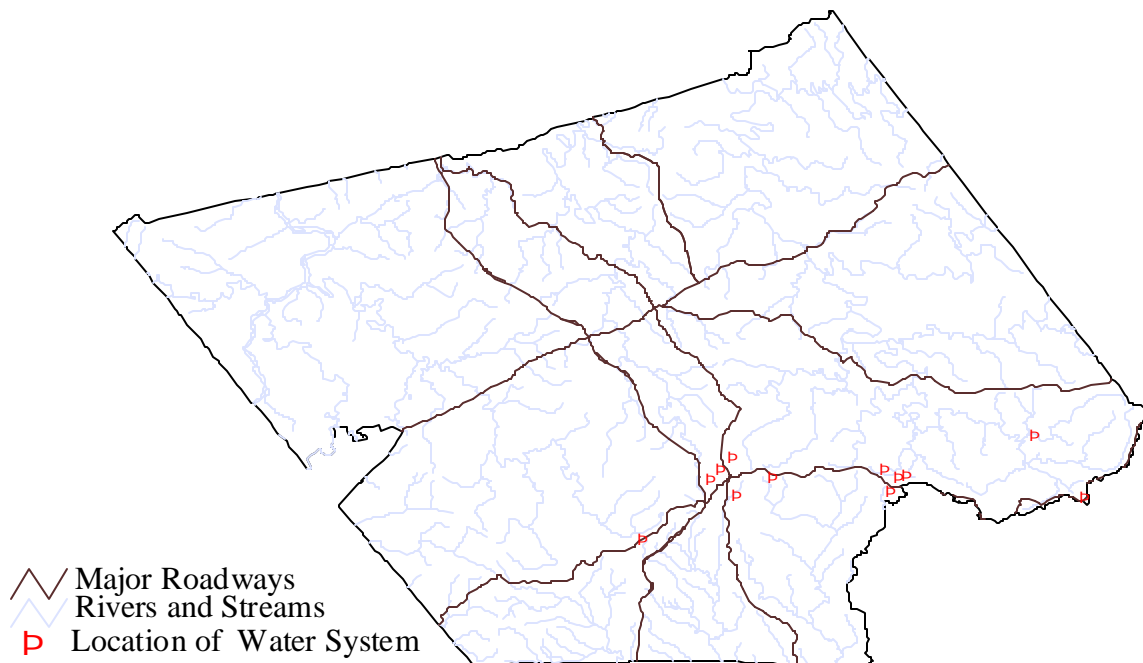


Figure 3.2. Targeted SPWS in Carroll County, Virginia

### 3.2 System Profiles

Of the twelve small water systems in the study area, six are under the jurisdiction of the Office of Water Programs in Abington, Virginia. These six water systems (Olde Mill Golf Course, Buck Hollar/Doe Run Lodge, Cascade Mountain Resort, Chalet High Inc., High Chaparral Inc., and Alpine Crest) are all classified as SPWS and extensive data is available on each. Three systems (Fox Trail Campground, Utt's Campground, and Lakeview Motel/Resturant) are under the jurisdiction of the county health department. Data is available on these three systems, but is limited. The last three small water systems are Volunteer Gap Inn and Cabins, Lonesome Pine Cabins and Cottages, and The Inn at Orchard Gap. These systems are too small to be considered a PSWS and are, thus, not regulated by the Virginia Department of Health. Since these systems are not subject to government reporting requirements or regulations, no system data is collected.

The Olde Mill Golf Course water system consists of a drilled well, a 100,000 gallon steel storage tank, and a distribution system. The source of the water system is ground water. The system currently has thirteen connections and serves anywhere from 125 to 60 people. The number of people on the system varies due to the seasonality of the golf course and turnover of people staying at the hotel style facilities. It has a design capacity of pumping 12,000 gallons per day but has an average daily usage of approximately 3,772 gallons per day. This results in an average of 314 gallons per day pumped per connection on the system (10,11). This SPWS has had three safe drinking water violations since 1990. In June and July of 1995, the water system had a maximum contaminant level (MCL), monthly Total Coliform Rule (TCR) violation. These violations can mean one of two things: more than five percent of the time this system tested positive for Coliform when testing more than 40 samples or this system had more than one sample testing positive for Coliform when testing fewer than 40 samples. These testing standards are set by the EPA. A public notification is requested as a follow up action by the EPA in both cases. In August 1996, the system had a less significant monitoring and reporting violation. The violation was the result of a failure to collect appropriate number of samples for the period under the TCR (5).

The Buck Hollar/Doe Run Lodge water system consists of three drilled wells, a 50,000 gallon atmospheric tank, 5,000 gallon hydropneumatic tank, and 1,000 gallon flood tank. Corrosion is controlled by a orthophosphate passivation and the system has chlorination facilities. The source of the water system is ground water. The system currently has 134 connections and serves anywhere from 70 permanent residents to 180 transient people. The number of people on the system at Doe Run varies due to the seasonality of the lodge, but the number of residents in the Buck Hollar community does not fluctuate as much. It has an existing flow capacity of pumping 100,000 gallons per day with an average daily usage of 3,772 gallons per day. This results in an average of 109 gallons per day pumped per connection on the system (10,11). This SPWS has had ten safe drinking water violations since 1990. The system had eight monitoring TCR violations from 1992 to 1999. In April, 1999 the system had a violation of the lead and copper rule and in February, 2000 the system had a consumer confidence report reporting violation (5).

The Cascade Mountain Resort water system consists of five drilled wells, five 20 gallon bladder type surge tanks, four (75,000; 60,000; 50,000; 40,000 gallon) atmospheric tanks, two booster pumps and stations, two 120 gallon bladder type tanks, one 40 gallon bladder type tanks, and a “jet type” booster pump. The source of the water system is ground water. The system currently has 80 connections and serves a population of 125 people. It has an existing design capacity of pumping 92,800 gallons per day with an average daily usage of 11,941 gallons per day. This results in an average of 149 gallons per day pumped per connection on the system (10,11). This SPWS has had fifteen safe drinking water violations since 1990. The system had fourteen monitoring TCR violations from 1992 to 2001. In 1994, the system had a violation of the lead and copper rule (5).

The Chalet High Inc. water system consists of three drilled wells, two 10,000 gallon hydropneumatic tanks, one 6,000 gallon hydropneumatic tank, one booster pump, and two separate soda ash treatment systems for corrosion control treatment. The system currently has 104 connections and serves a population of approximately 150 people. It has an existing design capacity of 112 connections or pumping 10,528 gallons per day. This results in an average of 149 gallons per day pumped per connection on the system (10,11). This SPWS has had sixteen safe drinking water violations since 1990. The system had twelve monitoring TCR violations and three violations of the lead and copper rule since 1991. In 2000, the system had a consumer confidence report reporting violation (5).

The Chaparral Inc. water system consists of one drilled well, two 120 gallon hydropneumatic tanks, and one 10,000 gallon hydropneumatic tank. The source of the water system is ground water. The system currently has thirty-two connections and serves a population of ten to forty-five people. It has an existing design capacity of pumping 7,000 gallons per day with an average daily usage of 1,810 gallons per day. This results in an average of 56 gallons per day pumped per connection on the system (10,11). This SPWS has had two safe drinking water violations since 1990. Both violations were monitoring TCR violations (5).

The Alpine Crest water system consists of one drilled well, two hydropneumatic tanks, and a chlorination system. The source of the water system is ground water. The system currently has thirty-three connections and serves a population of seven to forty people. It has an existing design capacity of 33 connections or pumping 13,600 gallons per day, with an average daily usage of 2,012 gallons per day. This results in an average of 61 gallons per day pumped per connection on the system (10,11). This SPWS has had eleven safe drinking water violations since 1990. The system had ten monitoring TCR violations and one violation of the lead and copper rule (5).

### **3.3 Analytical Approach**

The objective of this study is to consider the feasibility of gaining efficiencies in management and operation of SPWS by forming a cooperative entity. To analyze the

feasibility of the cooperative concept for SPWS in Fancy Gap, Virginia, a four part survey was developed. The goal of this survey was to determine the potential for forming a Small Water System Cooperative. The survey tool was designed to collect quantitative and qualitative data in four segments of a SPWS's operation: water system characteristics; management, operations, and maintenance; cooperative management; and financial management. The survey was administered to all twelve system operators in the form of a one-on-one personal interview.

The first section of the survey, water system characteristics, contained twenty-seven questions. These questions were designed to access the physical characteristics of the water system, such as the number and type of connections, gallons of water pumped, age of the system, and other general information on the actual physical water system. Data from this section was also used to estimate current and potential future demand on the individual water systems.

The second section of the survey was composed of twenty questions on the management, operations, and maintenance of the water system. Respondents were asked questions pertaining to the daily operations on the system. Questions in this section covered topics such as operator certification, preventative maintenance plans, leak and repair programs, and the ability to upgrade the system.

The third section of the survey was designed to access the operators knowledge of cooperatives. Operators were asked thirteen qualitative questions. The purpose of this section was to determine the needs of the SPWS and ways that they could benefit from a cooperative structure.

The fourth section of the survey was designed to analyze the financial situation of each water system. However, many of the water system operators that were interviewed did not have any financial data on their system. All of the water systems had a budget, however the budgets for all systems but one were incorporated in overall maintenance budgets. Therefore, it was virtually impossible for many of the operators to answer the questions in this section of the survey with any accuracy.

### **3.4 Preliminary Statistical Results and Analysis**

The data collected from the survey were coded; quantitative data were entered into an excel spreadsheet and qualitative responses were recorded in a access database. Due to the fact that there were only twelve data points, any further statistical analysis and inference has limited extension beyond the sample. Nevertheless, the excel data was entered into SAS. To determine if there was any correlation among the variables, a GENMOD (Generalized Linear Models Approach to Dependent Count Data) procedure was applied to several selected variables. Of the ten preliminary statistical hypotheses tested, comparing a dependent and independent variable, this procedure found subtle significance in only four. More data points would likely generate more reliable comparisons and correlations.

Section one of the survey revealed many similarities and differences among the twelve SPWS. All of the systems use a well as the primary source of water for their systems. The individual ages of the systems ranged from three years to thirty years old, with a median age of sixteen years. The results of a GENMOD analysis revealed that:

- As the age of the system (dependent variable) increased the number of drinking water violations (independent variable) also increased. This logical statistic could be the result of a number of factors including degeneration of facilities and equipment of the water systems. The type of connections on the water systems in the study could be single family households, multi-unit residences, trailer parks/campgrounds, commercial, or industrial connections. Figure 3.3 shows the cumulative totals of each type of connection for all the systems.
- As Figure 3.3 illustrates, the majority of the connections in the SPWS in this study are from single family households and trailer parks/campgrounds. There were no connections from industrial sources.
- Fifty-eight percent of operators feel that the overall demand (number of people) on their systems is stable, while forty-two percent feel that the overall demand is growing.
- Seventy-five percent (nine operators) said that they will be able to meet the water demand needs with their current system over the next ten years.
- Of the three that felt that they would not be able to meet the water demands only two system have a written plan to increase their capacity.
- Fifty percent of the systems expect new single family household connections in the next ten years.
- Only two systems expect new multi-unit residence connections.
- No other types of connections were expected for the next ten years.
- Of the nine SPWS that are monitored by the VDH, all have had drinking water violations within the past ten years.

These figures give a small glimpse into the characteristics of the systems in the study, their current water demand, and the potential future change in demand operators expect.

Section two (management, operations, and maintenance) focused on how the water system are managed. The following points summarize the some of the results.

- The Safe Drinking Water Act requires that all SPWS have a certified operator. Only two of the nine systems required to have a certified operator have one. All of the systems have at least one uncertified operator, some having up to five.
- With all of these uncertified operators, it is interesting to note that only fifty-eight percent receive regular outside technical assistance. However, all of the operators responded that they knew where to get technical assistance if needed.
- All of the systems have a policy for handling consumer complaints.
- In the event of new technologies to increase efficiency or new requirements by the government, nine operators said that their systems are designed to be easily upgraded.

Of the nine SPWS that are required to keep records by the Virginia Department of Health, Table 3.1 shows the types of records and number of systems that keep records. Note that the only record that all nine systems keep is records on water

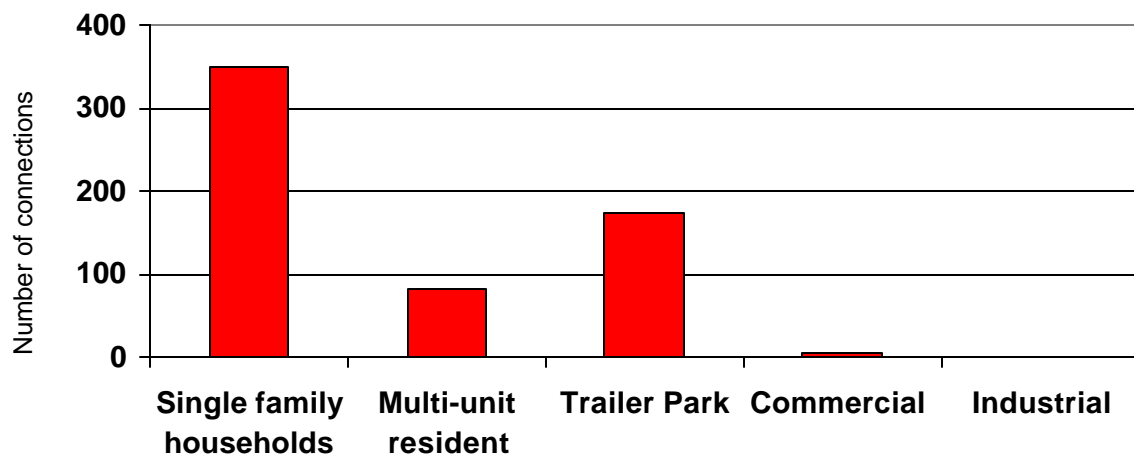


Figure 3.3. Total Number of Connections

Table 3.1. Records Kept By SPWS

| Type of Record Kept             | Number of systems |
|---------------------------------|-------------------|
| Water quality testing           | 9                 |
| Water consumption rates         | 5                 |
| Customer complaints             | 3                 |
| Existing equipment and supplies | 1                 |
| Chemicals used in system        | 2                 |

quality testing. Due to time constraints and other various reasons, not all operators keep the other important records.

- Of the three systems that had computers, two had Internet access.

From section three of the survey, operators were asked what were some of the barriers, advantages, and disadvantages to forming a cooperative. Table 3.2 summarizes their responses, with the most frequent responses listed first. Many of the system operators had valid concerns and reservations about the effectiveness of a cooperative. However, many of the advantages that operators want are exactly what a cooperative structure would provide.

- The cooperative could pool resources to reduce administrative duties such as producing consumer confidence reports and other documents required by the VDH.
- Two of the twelve systems have volunteer operators. The average time spent on the water systems was approximately five hours with the most time being eleven hours. In general, all the operators expressed a desire to reduce the time spent on the water system, especially the two volunteers. This is another advantage a cooperative could provide.
- Also members of the cooperative could share one or more certified operators, another requirement of the Safe Drinking Water Act.
- Many operators mention their desire for the county to extend its public water system to their area. A cooperative of these local SPWS would focus an effort to get this service, even though it would eventually result in the diffusion of the cooperative.

From the preliminary analysis of all the statistical data from the survey of the SPWS operators, several points stand out.

- Systems are committing drinking water violations
- As system ages the number of drinking water violations also increases
- Many systems still do not have the required certified operator
- Operators want a means to exchange information
- Operators are spending more time on the water systems than they desire

All of these problems and concerns could be corrected or even eliminated if the SPWS join together and form a cooperative. However, a critical aspect of this study is taking these responses and determining the specific type of cooperative that would maximize the benefits to all water systems involved.

Table 3.2 Summary of Important Factors in Forming SPWS Cooperative

|                                  |   |
|----------------------------------|---|
| Barriers to forming a co-op      | <ul style="list-style-type: none"> <li>➤ Conflicting personalities</li> <li>➤ Money issues (expenses)</li> <li>➤ Internal politics</li> <li>➤ Size of operation</li> <li>➤ Distance between SPWS</li> <li>➤ Resistance from homeowners</li> <li>➤ Time limitations of operators</li> <li>➤ Competition between businesses</li> <li>➤ Problem due to the sale of a system</li> <li>➤ No government regulation of co-op</li> <li>➤ Right of way issues</li> <li>➤ New regulations on chemicals</li> <li>➤ Liability (legal) issues</li> </ul>           |
| Advantages of forming a co-op    | <ul style="list-style-type: none"> <li>➤ Exchange of information (technical and political)</li> <li>➤ Increased, focused effort to get public water to the area</li> <li>➤ Help with administrative activities</li> <li>➤ Access to a certified operator</li> <li>➤ Local resource for problems or questions</li> <li>➤ Reducing administrative burden of one person</li> <li>➤ Getting help with routine testing</li> <li>➤ Access to more educational opportunities</li> <li>➤ Availability of another SPWS's water in case of emergency</li> </ul> |
| Disadvantages of forming a co-op | <ul style="list-style-type: none"> <li>➤ Improper management resulting in drinking water violations</li> <li>➤ Geographic limitations</li> <li>➤ Time limitations of individuals involved</li> <li>➤ Right of way issues</li> <li>➤ New regulations on chemicals</li> <li>➤ Economic and monitory feasibility</li> <li>➤ Liability (legal) issues</li> </ul>  |

## **4. Conceptual Options**

### **4.1 Decision Making Process for Small Water Systems**

The businesses in this study have a clear decision making process. To gain their participation the owners and/or operators must see the benefits and costs of a cooperative before they will be willing to join. Survey results reveal that there are several administrative and technical activities that operators feel could be done more efficiently by a cooperative of SPWS. Some administrative activities that could be done via a cooperative include: generating mandatory Consumer Confidence Reports and other EPA documents, assistance in developing budgets, and comparing costs with other SPWS. Technical services that could be done cooperatively include: exchanging technical knowledge and information, sharing physical resources, networking with SPWS operators, sharing information on funding processes, and sharing usage figures. Even after showing these benefits of a cooperative, the proposed SPWS cooperative must be economically feasible for all SPWS involved. When asked how their water customers would view a cooperative structure, all SPWS operators responded that their customers would be indifferent to the change in structure as long as service quality remains high, service reliability remains high, quality of water is good, and there is no increase in the price of the water.

### **4.2 Goals of the Cooperative**

Any cooperative effort that these SPWS embark on will have very specific goals. The primary goal of this proposed cooperative would be to provide the public with safe, high quality drinking water by decreasing the number of drinking water violations in all of its SPWS members. Another goal of this cooperative of SPWS would be to create a medium by which the cooperative can buy or provide products and/or services to its members that would be too costly to obtain on an individual system basis. By assuring high levels of business to vendors, the cooperative might be able to benefit from quantity purchasing discounts. A further goal for the cooperative would be to strive to lower administrative costs of each SPWS by pooling the resources and delegating responsibilities among all of the SPWS members (14). For these specific SPWS, a goal of the cooperative organization could possibly be to organize an enhanced effort to get the county to extend its public water to the Fancy Gap area.

### **4.3 Cooperative Structure**

Cooperatives have been around for many years. The International Co-operative Alliance's Information Center defines cooperatives as:

*“an autonomous associations of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise” (9)*

There are seven founding principles that were first established in 1844 (9). These principles include:

1. Voluntary and Open Membership
2. Democratic Member Control
3. Financial Obligation and Benefits Proportional to Use
4. Autonomy and Independence
5. Education, Training and Information
6. Cooperation Among Cooperatives
7. Concern for Community (9)

Specifically, shared-service cooperatives are a way to provide high quality services competitively to rural communities and expand the welfare of its members (10). The organizational structure suggested in this case study will be a shared-service, non-profit cooperative (14). Small public water systems will want to join this type of organization because it will allow them to purchase items jointly (reducing cost and increasing purchasing options), better respond to government policy changes, share information, and provide member training, certification, and other educational opportunities. There is one characteristic of shared-service cooperatives that make them different from other organizational structures. Shared-services cooperatives operate to provide benefits to the members as users, not as financial investors (10).

Other important issues for cooperatives include taxation requirements and other required legal documents. The federal tax code explains the special tax considerations for cooperatives in Subchapter T (4). A cooperative is a flow-through entity, where any profits are distributed to members as patronage refunds. Subchapter T of the tax code basically states that a cooperative is not taxed as an entity; however, each member is responsible for paying tax on any patronage dividend (refund) received. The rules are slightly different for a non-profit cooperative. Unlike regular cooperatives, the members of a non-profit cooperative have no tax liability because all surplus is placed in a reserve fund. There are no patronage refunds distributed to members, and members do not have access to the cooperative's retained funds. Any revenue (income) generated from activities not within the principal purpose of the cooperative is subject to taxation just as in regular cooperatives (10,13). However, non-profit cooperatives still have to pay all of the local, state, and federal taxes that other businesses pay (6).

There are two organizational/legal documents that the SPWS cooperative will have to develop, Articles of Incorporation and Bylaws. Articles of Incorporation are a statement of the scope and kind of the business the cooperative is intended to do. This statement must be drawn up to conform to state laws. Even if service is initially limited, Articles of Incorporation usually specify broad incorporating authority (15). These articles usually include the name of the cooperative, principle place of business, purposes and powers of the cooperative, proposed duration of the cooperative, names of the incorporators, and a provision for redemption of member equity (sometimes included in the Bylaws) (4).

Bylaws of a cooperative are basically its operational rules. The Bylaws explain in more detail the Articles of Incorporation and state the rights and obligations of the members

and the board of directors (15). The following is a list of the items that are typically included in Bylaws.

- Requirements for membership
- Rights and responsibilities of membership
- Grounds and procedures for member expulsion
- Voting procedures
- Procedures for calling and conducting membership meetings
- Procedures to elect or remove directors and officers
- The number, duties, terms of office and compensation of directors and officers
- Time and place of the directors meetings
- Dates of the fiscal year
- Information on how the net earnings will be distributed
- Other rules for management of the cooperative (4)

A committee representing the interests of the potential cooperative, together with an attorney (so that the documents will comply with state laws) traditionally prepares the Bylaws and Articles of Incorporations (4). Attached in the appendix is a sample outline of a cooperative's legal documents including Articles of Incorporation and Bylaws developed by The United States Department of Agriculture's Rural Business Cooperative Service (11).

#### **4.4 Benefits of Cooperative Structure**

A shared-service cooperative can provide each SPWS member with several benefits. The United States Rural Business-Cooperative Service list five benefits of general cooperative structures, which also apply to shared-service cooperatives (12):

1. *Access to quality supplies and services at reasonable costs*
2. *Increased clout in the marketplace*
3. *Share in the earnings*
4. *Political action*
5. *Local economy enhanced and protected*

A shared-service cooperative will allow the SPWS to purchase chemicals, supplies, equipment, and expert services in larger volumes and at lower costs. This is a result of economies of scale. When these smaller water systems join together, they can enjoy the same efficiencies and opportunities as larger municipal water systems, which were once unavailable to SPWS. By joining together, the SPWS will also benefit from increased clout in the marketplace. This benefit alone is important to members, because it means that together they have improved bargaining power when dealing with other businesses or organizations. If the cooperative generates any earnings, each member will have a share of those earnings based on usage of the cooperative. Along with a share in monetary earnings, the members of the cooperative will have a means to share information on technical, managerial, and operational aspects of their systems. Member control is another beneficial aspect, which refers to the cooperative policy of one member, one

vote. Increased political action is one of the most important benefits to the SPWS in this study. Carroll County has considered extending its public water system out to the town of Fancy Gap. Due to the fact that operating and maintaining a SPWS is so demanding, many operators want the county to take over their systems. By forming a shared-service cooperative, the SPWS can voice their options and concerns louder than as individual systems, while maintaining their independence. One of the final benefits of a cooperative organization would be to the local economy and residents. In accordance with the goals of the cooperative, each SPWS operator could find ways to decrease the number of drinking water violations his/her system receives. By decreasing drinking water violations, the system can provide the community with a high quality drinking water. High quality drinking water has other beneficial effects on the local community such as attracting new residents or visitors, both of which stimulate the local economy (12). Additional benefits include: availability of important educational services and technical training sessions, sharing of information and experience, consolidations of administrative tasks (such as Consumer Confidence Reports), and the utilization of one certified operator for all systems.

#### **4.5 Proposed Cooperative**

For this case study, Figure 4.1 illustrates the proposed operational and management structure of, and major players in, a SPWS cooperative in Virginia. The board of directors for the cooperative includes representation elected by and from each of these three groups: the SPWS's operators, owners, and customers. Three other interest groups, which appoint their own board member, include: the state agency (Virginia Department of Health), the federal agency (Environmental Protection Agency), and the American Water Works Association. These elected board members govern the cooperative. The cooperative in turn has to deal with water customers from all of the SPWS, the actual physical SPWS themselves, and the government (14).

#### **4.6 Challenges Faced by New Cooperative**

This newly formed cooperative will face many challenges, some internal and some external. One major internal challenge that the cooperative will have to deal with is the problem of "free-riders". Free-riders are those members who do not participate in a program but reap the benefits of it. They will also take advantage of the benefits provided by other cooperative members' investments of time and/or money. Another internal challenge that threatens the longevity and success of the cooperative organization involves cooperation among its members. For example, getting all SPWS to adopt good management practices and conform to various standards and regulations will inevitably cause conflict among members. Traditional thinking and methods of operation is a key challenge that the cooperative must address immediately. The need to adopt new operational technologies is an example of one more internal challenge that the cooperative members must address (10).

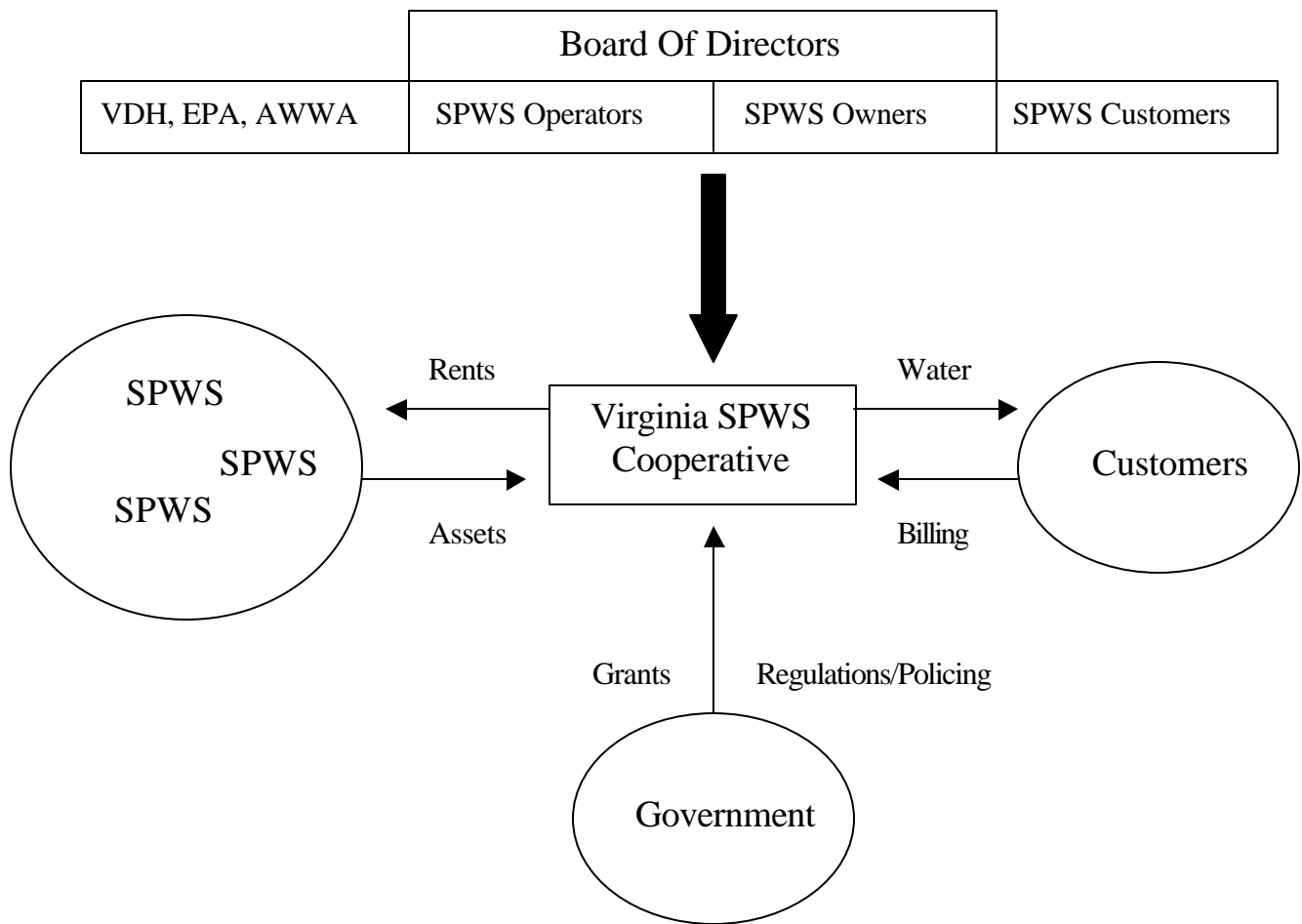


Figure 4.1. The Virginia Small Water Systems Cooperative Structure

External challenges are caused by forces outside the cooperative and outside the control of its members. In this study, some SPWS are operated as auxiliary businesses to the main businesses, which is in the tourism industry. Competition between these individual businesses could potentially cause conflict among members of the SPWS cooperative. This might reduce communication and important information sharing among members. Changes in technology and drinking water standards are other major external challenges for the cooperative. Cooperative members must stay aware of technological changes in the industry in order to continue to provide the highest quality drinking water at the lowest cost possible (10).

## **5. Conclusions**

The preliminary research indicates that the SPWS in this study would benefit by forming a shared-service, non-profit cooperative organization. However, indications from the personal interviews with the water system operators suggest that the individuals involved are not immediately willing to legally organize as a cooperative. The shared-service cooperative concept is unfamiliar to most operators, which presents a slight problem. Only twenty-five percent of operators interviewed said they knew of a cooperative in their community. In actuality, there is a cooperative in a nearby town. This supports the idea that the majority of operators are not familiar with any type of cooperative, its organization, or its purpose. Thus, all parties considering potential involvement need to be educated on all aspects of the cooperative concept. To solve this problem, a two-phase plan is suggested. Phase one involves an initial alternative, which would first organize the SPWS into an informal network of businesses. This alternative would allow the systems to start discussing problems and potential solutions right away. This informal network is not incorporated like a formal cooperative, but it will give the members a chance to experience the benefits and challenges of a cooperative environment. During this phase, the potential members must be educated on the benefits of a cooperative on their individual operation. Fact sheets, published by the United States EPA, can be used to help educate interested SPWS on cooperatives and their advantages. An informal network of businesses is a stepping-stone to phase two, the legal formation of a shared-service, non-profit cooperative.

This case study was based on SPWS in Fancy Gap, Virginia. From this case study analysis, it can be assumed that SPWS across the state are faced with similar problems and have similar concerns. This two phase cooperative plan can be implemented in other localities across the state, which exhibit similar system characteristics. It is understood that certain modifications will be necessary, but the general idea will apply to most cases in the state of Virginia.

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## Appendix

## Sample Legal Document Outlines

### Pre-membership Agreement

1. Statement of purposes for which new cooperative is to be formed.
2. Description of steering organization committee and its powers.
3. Statement of what new cooperative's bylaws will provide when formed.
4. Notice that steering committee may call meeting of prospective members.
5. Duties of steering committee to keep records and make accounting to cooperative when formed.
6. Subscription agreement for membership certificate or stock.
7. Agreement to sign marketing agreement if cooperative is to have one (II).

### Articles of Incorporation

of \_\_\_\_\_ Association

We, the undersigned, all of whom are residents and citizens of the State of \_\_\_\_\_, engaged in the production of agricultural products, do hereby voluntarily associate ourselves for the purpose of forming a cooperative association, (with/without) capital stock, under the provisions of the \_\_\_\_\_ Cooperative Marketing Act of the State of \_\_\_\_\_.

Article I- Name

Article II- Purposes

Article III- Powers; Limitations

Section 1. Powers

Section 2. Limitations

Article IV- Place of Business

Article V- Period of Duration

Article VI- Directors

Article VII- Membership (for non-stock cooperative) or

Article VII- Capital Stock (for stock cooperative)

Section 1. Authorized Amounts; Classes.

Section 2. Common Stock.

Section 3. Preferred Stock.

In testimony whereof, we have hereunto set our hands this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_.

State of

County of \_\_\_\_\_SS.

Before me, a notary public, within and for said county and State, on this \_\_\_\_ day of \_\_\_\_\_, 19\_\_, personally appeared \_\_\_\_\_, known to me to be one of the identical persons who executed the within and foregoing instrument, and acknowledged to me that he/she had executed the same as a free and voluntary act and deed for the uses and purposes therein set forth.

Witness my hand and official seal the day, and year, set forth.

Notary Public \_\_\_\_\_

In and for the County of \_\_\_\_\_, State of \_\_\_\_\_.

My Commission expires \_\_\_\_\_ (11)

## **Bylaws**

### Article I - Membership

Section 1. Qualifications.

Section 2. Suspension or Termination.

### Article 11 - Meetings of Members

Section 1. Annual Meetings.

Section 2. Special Meetings.

Section 3. Notice of Meetings.

Section 4. Voting.

Section 5. Quorum

Section 6. Order of Business.

Determination of quorum.

Proof of due notice of meeting.

Reading and disposition of minutes.

Annual reports of officers and committees.

Unfinished business.

New business

Election of directors.

Adjournment.

Article III - Directors and Officers

Section 1. Number and Qualifications of Directors.

Section 2. Election of Directors.

Section 3. Election of Officers.

Section 4. Vacancies.

Section 5. Board Meetings.

Section 6. Special Meetings.

Section 7. Notice of Board Meetings.

Section 8. Compensation.

Section 9. Quorum.

Article IV - Duties of Directors

Section 1. General Powers.

Section 2. Employment of Manager.

Section 3. Bonds and Insurance.

Section 4. Accounting System and Audit.

Article V - Duties of Officers and Manager

Section 1. Duties of President.

Section 2. Duties of Vice President.

Section,, 3. Duties of Secretary.

Section 4. Duties of Treasurer.

Section 5. Duties of Manager.

Article VI - Executive Committee and Other Committees

Section 1. Powers and Duties.

Section 2. Other Committees.

Article VII - Membership Certificates

If the association is organized with capital stock, the outline might read:

Article VII - Stock Certificates

Section 1. Common Stock.

Section 2. Other Committees.

Article VIII - Operation at Cost and Patrons' Capital

Section 1. Service at Cost.

Section 2. Refunds and Patrons' Capital.

Section 3. Revolving Capital.

Section 4. Transfer.

Section 5. Consent.

Section 6. Consent Notification to Members and Prospective Members.

Article IX - Dissolution and Property Interest of Members

Article X - Unclaimed Money

Article XI - Fiscal Year

## Article XII - Miscellaneous Provisions

Section 1. Waiver of Notice

Section 2. Bylaws Printed.

Section 3. Seal.

## Article XIII - Amendments

We, the undersigned, being all of the incorporators and members of the \_\_\_\_\_ association, do hereby assent to the foregoing bylaws and do adopt the same as the bylaws of said association; and in witness whereof, we have hereunto subscribed our names, this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_ (11).

## Membership Application and Marketing Contract

THIS AGREEMENT between the \_\_\_\_\_, Inc., hereinafter referred to as the Association, and the undersigned Producer, witnesseth:

### *The Producer*

1. Applies for membership in the Association, and if accepted as a member, agrees to be bound by its articles of incorporation, bylaws, rules, and regulations as now or hereafter adopted.
2. Appoints the Association as agent to sell all the \_\_\_\_\_ of marketable quality produced on any farm in control of or operated by the Producer, except that required for consumption on the farm.
3. Will deliver such products at such times and to such places in unadulterated form under such conditions as may be prescribed by proper authorities.
4. Will notify the Association of any lien on the products delivered hereunder, and authorizes the Association to pay the holder of said lien from the net proceeds derived from the sale of such products before any payment is made to the Producer hereunder.
5. Will provide capital in such amounts and in such a manner as may be provided in the bylaws.

### *The Association*

1. Accepts the application of Producer for membership in the Association.
2. Agrees to act as agent for the marketing of products of Producer as herein provided.
3. Will dispose of Producer's products in a manner deemed to be most advantageous for its members.

4. Will account to the Producer in accordance with this contract for all amounts received from the sale of products as herein provided.

5. Will reflect in an appropriate capital account the capital received from each patron.

The *Producer and the Association* mutually agree that the Association shall have the power:

1. To establish various plans for making returns to the Producer.
2. To blend or pool proceeds from sales of products of the Producer with the proceeds of the sales of products of other Producers, and to account to or settle with Producer therefore in accordance with established plans.
3. To process or cause to be processed products of the Producer and dispose of the same in the manner deemed most advantageous to its members.
4. To collect from buyers of products the purchase price therefore and to remit the same to Producer under a plan authorized by this contract after making uniform deductions deemed adequate for all necessary, expenses and for capital purposes.

In case of a breach of this contract by the Producer, the actual damage to the Association and other producers cannot be determined. Therefore, Producer agrees to pay to the Association as liquidated damages for such breach, the sum of \_\_\_\_\_dollars (\_\_\_\_\_) per \_\_\_\_\_on all products that would have been delivered had the Producer not breached the said contract.

And the Association shall further be entitled to equitable relief by injunction or otherwise to prevent any such breach or threatened breach thereof and the payment of all costs of litigation in connection with the exercise of any or all of the remedies available to the Association.

This contract shall remain in effect for an initial term of (\_\_\_\_) years from the date hereof. Following the initial term, the contract may be cancelled by notice given in writing by either party to the other within ten (10) days after any yearly anniversary date, and such cancellation shall become effective on the last day of the second calendar month following the month during which such notice is given.

Date \_\_\_\_\_

Producer's signature \_\_\_\_\_ (\_\_\_\_\_)   
 *print name here*

Address \_\_\_\_\_   
 (R.F.D. or Street No.) (Town) (State and Zip Code)

Social Security No. \_\_\_\_\_ County \_\_\_\_\_   
 Accepted this day of \_\_\_\_\_, 19\_\_\_\_.

\_\_\_\_\_,Inc.   
 By \_\_\_\_\_, Pres.   
 By \_\_\_\_\_, Secy.

(Some State laws provide for filling or recording cooperative marketing contracts in a county recorder's office to give notice to third parties that the contract exists. And acknowledgment if the contract is to be filed or recorded (11).)

## Membership Certificate

This certifies that \_\_\_\_\_ of \_\_\_\_\_ is a member of \_\_\_\_\_ Association and is entitled to all of the rights, benefits, and privileges of the Association.

Date \_\_\_\_\_.

\_\_\_\_\_  
(President)

## Waiver of Notice of First Meeting of Board of Directors

We, the undersigned, being all the directors of

\_\_\_\_\_  
(Name of association)

\_\_\_\_\_  
(State)

\_\_\_\_\_  
(Town)

hereby waive notice of a meeting of such directors at \_\_\_\_\_ o'clock am./pm.

on \_\_\_\_\_ the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, at

\_\_\_\_\_ in \_\_\_\_\_, \_\_\_\_\_

(Place of Meeting) (Town) (State)

for the purpose of electing officers of the association to serve during the ensuing year, adopting the form of marketing contract, and hereunto subscribed our names, this

\_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_ (11).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_