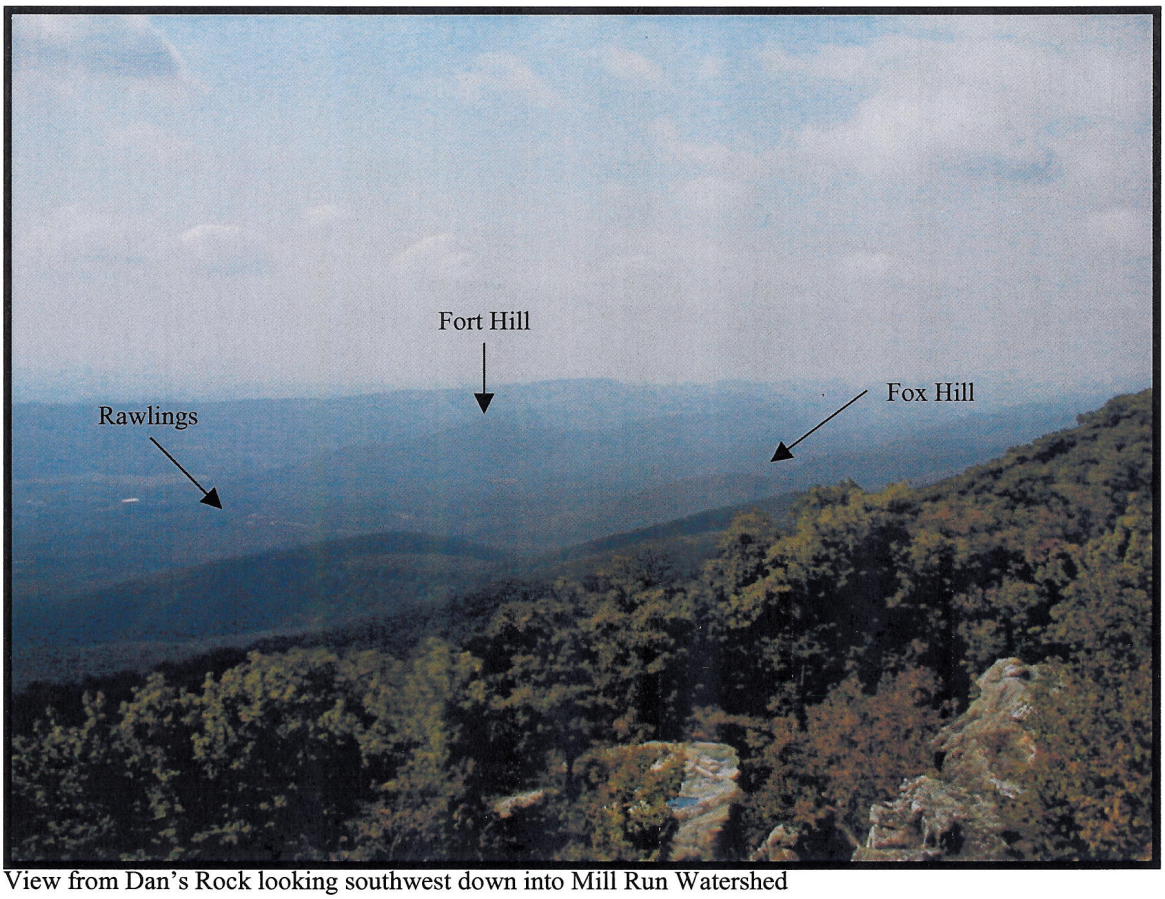
SOURCE WATER ASSESSMENT

for the

Rawlings Heights Water Company

Allegany County, Maryland



View from Dan's Rock looking southwest down into Mill Run Watershed

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EXECUTIVE SUMMARY

The required components of this report as described in Maryland's Source Water Assessment Plan are the delineation of the area that contributes water at the source; identification of potential sources of contamination; determination of the susceptibility of the water supply to contamination; and recommendations for protecting the drinking water supply.

Mill Run, a spring fed stream, is the main source of water that provides drinking water to approximately 700 customers of the privately owned Rawlings Heights water system. The entire watershed above the intake encompasses approximately 590 acres of forested land located on the eastern slope of Dan's Mountain in Allegany County, Maryland. Potential sources of contamination to Mill Run are improper forestry practices that may increase the sediment in streams and lead to higher turbidity, runoff from improved and unimproved roads in the watershed and human and animal activities in the source water protection area. Review of water quality data indicates that sedimentation and contamination by microbial and pathogenic organisms are the major concerns.

Like other surface sources in the State, Mill Run's watershed is vulnerable to pathogenic organisms. Continuous monitoring of contaminants is important to understand changes in raw water quality to assure delivery of safe drinking water to the Rawlings Heights customers.

Several recommendations are included in Section I of this report. They include:

- Forming a local watershed protection planning team.
- Implementing public awareness and outreach program.
- Monitoring water quality of raw and finished water.
- Land acquisition easements for sensitive areas in the watershed.
- Updating contaminant source inventory in the watershed.

A. BACKGROUND

The 1996 Safe Drinking Water Act Amendments require states to develop and implement source water assessment programs to evaluate the safety of all public drinking water systems. A Source Water Assessment (SWA) is a process for evaluating the vulnerability to contamination of the *source* of a public drinking water supply. The assessment does not address the treatment processes, or the storage and distribution aspects of the water system, which are covered under separate provisions of the Safe Drinking Water Act. The Maryland Department of the Environment (MDE) is the lead state agency in this source water assessment effort.

There are three main steps in the assessment process: (1) *delineating* the watershed drainage area that is likely to contribute to the drinking water supply, (2) *identifying* potential contaminants within that area and (3) *assessing* the vulnerability of the system to those contaminants. This document reflects all of the information gathered and analyzed required by those three steps. MDE looked at many factors to determine the vulnerability of this water supply to contamination, including the size and type of water system, available water quality data, the characteristics of the potential contaminants, and the capacity of the natural environment to attenuate any risk.

Maryland has more than 3,800 public drinking water systems. Approximately 50 of Maryland's public drinking water systems obtain their water from surface supplies, either from a reservoir or directly from a river. The remaining systems use ground water sources. Maryland's Source Water Assessment Plan was submitted to the Environmental Protection Agency in February 1999, and received final acceptance by the EPA in November 1999. A copy of the plan can be obtained at MDE's website, www.mde.state.md.us, or by calling the Water Supply Program at 410-537-3714.

B. THE RAWLINGS HEIGHTS WATER SUPPLY

The Rawlings Heights Water Company serves the communities of Rawlings and Rawlings Heights in southern Allegany County, Maryland. These communities are located along Maryland Route 220, southwest of Cresaptown and Cumberland and lie within the North Branch of the Potomac River valley. The water system receives water from Mill Run, a small mountain stream, by diverting into a holding pond and pumping it to a small water treatment plant located on Dan's Mountain above the community. The plant was constructed sometime in the 1960's and has remained privately owned since.

Water from Mill Run is diverted from the stream into a small holding basin, where the intakes are located, and pumped to the small plant approximately 100 yards above the pond on the sloped stream valley. The small plant employs pressure sand filtration and injects chlorine for disinfection. From there water goes into a raw storage tanks and then is "polished" by three 0.35-micron cartridge filters, and injected with chlorine again. Treated water is then stored in a 22,000-gallon tank before entering the distribution system. The plant is in operation 24-hours a day.

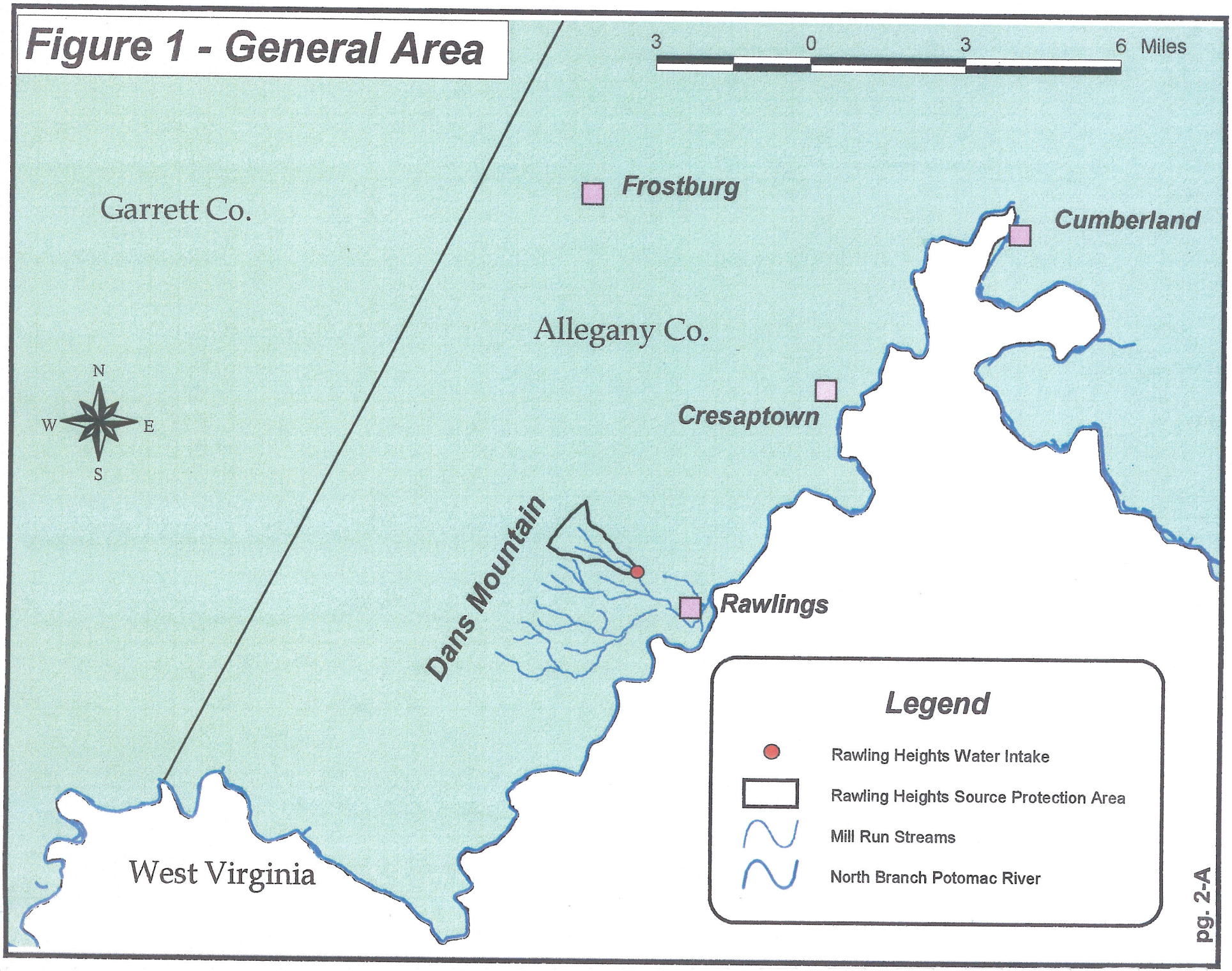
Figure 1 - General Area
3 0 3 6 Miles
Garrett Co.
Frostburg
Cumberland
Allegany Co.
N
W
E
S
Cresaptown
Dans Mountain
Rawlings
West Virginia
Legend
Rawling Heights Water Intake
Rawling Heights Source Protection Area
Mill Run Streams
North Branch Potomac River
pg. 2-A

The plant serves approximately 700 people with 275 system connections. The plant's unique treatment set-up makes a solid production capacity number tough to estimate, however, the system is permitted a daily average allocation of 50,000 gallons (on a yearly basis). Most of the water supply is for domestic use, and a majority of the connections are in the Mountain Club residential subdivision. The small system has had treatment equipment problems in the past, and plans are underway to upgrade the plant.

C. DESCRIPTION OF SURFACE SOURCE

Mill Run is the main source of drinking water for the Rawlings Heights system. The stream is spring fed and begins on the eastern slope of Dan's Mountain, approximately 1-½ miles above the holding pond diversion and intake. There are two small tributaries in this section of Mill Run, the confluence is approximately 0.7 miles above the intake. Mill Run combines with several smaller streams below the intake and eventually flows into the North Brach of the Potomac River past Rawlings. Mill Run is shallow and only a few yards wide at the point where water is diverted into the holding pond. Flow at the diversion has not been recorded, but the United States Geological Survey (USGS) took several measurements on Mill Run at a point downstream of the intake. Six measurements were taken there from 1979 to 1980, and stream flow ranged from 0.22 cubic feet per second to 20 cubic feet per second (cfs), depending on the season.

The source water protection area (watershed) for the Rawlings Heights water system comprises 590 acres (less than a square mile) of completely forested land on the eastern slope of Dan's Mountain. The watershed is approximately 1.7 miles long from the ridge of Dan's Mountain to the intake and is shaped like an arrowhead, wider along the ridge. Wolf Rock, elevation 2740 mean sea level (msl), is the highest point and forms the northwest corner of the watershed. Fox Hill, (1720 msl) is the only other named geologic feature in the area and it forms the northern watershed border. The Rawlings Heights source watershed shares a border (Dan's Mountain) with the Town of Lonaconing's Midland-Gilmore reservoir source watershed.

The source watershed is located on the border of the Allegany Plateau physiographic province. The Ridge and Valley province lies east from the foot of Dan's Mountain. Streams in this province are characterized by their steep slopes and flashy nature (Slaughter, 1962). The average approximate slope in the source watershed is 17%. More than 50% of the Allegany County surface area is located on slopes greater that 25%, and thus making land not well suited for extensive urban development, or for individual wells or septic system use (Allegany County Water & Sewer Plan, 1997).

The climate of Allegany County is temperate and moderately humid. The mean annual temperature is 52.9 °F and the mean annual precipitation is 37.8 inches. Local climate conditions in the county can be influenced by the elevation, and height and width of mountains, which modify air masses moving eastward (Slaughter, 1962).

D. SOURCE WATER PROTECTION SITE VISIT

Personnel from Maryland Department of Environment's Water Supply Program visited the Rawlings Heights water system on June 23rd, 1999 to perform a preliminary site visit assessment of the source watershed and intake structure for the water plant. Main objectives of the site visit included: obtaining a GPS location of the water supply intake, inspect the integrity of the intake, and document source water concerns in the watershed.

Intake Integrity

There are two intakes located in the middle of the concrete holding pond. Water is diverted from the stream by a simple wooden gate into the pond, which has a volume of approximately 80,000 gallons. Two intake pipes are located at the end of the holding pond, just off the bottom, in approximately 2-3 feet of water. The pipes are housed in a box-like structure that appears to be screened on several sides. On the day of the site visit, large rocks were in place on the top of the box holding a screen in place (see photo in Appendix). There is no scheduled maintenance on the screens, but they are cleaned as needed, and tend to clog during heavy storms and runoff. The pond is cleaned out, i.e. raked of leaves, as needed (MDE Inspection Reports).

From the intake box, the two pipes flow by gravity to a pump house adjacent to the pond. The pipes are made of PVC plastic; one has a 2-inch diameter the other a 4-inch diameter. From the pump house a single 4-inch intake line travels approximately 100 yards uphill to the small water treatment plant.

Raw water turbidity (a measure of water cloudiness) at the plant can be controlled by limiting or completely stopping the stream flow diversion into the holding pond. According to an old water plant manual, if the stream's turbidity reaches 5 NTU, the wedge check gate is closed to prevent turbid water from entering the holding pond.

Since the completion of the draft report, Rawlings Heights Water Company made several improvements to the treatment facilities and intake structure.

Concerns and Site Visit Observations

In addition to looking at the intake structure, personnel looked at the land immediately upstream of the intake and a MDE field engineer/inspector asked the water company owner for any concerns regarding the source of raw water, Mill Run. Below is a list that reflects the water plant owner's concerns and MDE observations:

1. Storms and snowmelt runoff will cause the turbidity to rise in Mill Run.
2. An exposed slope on the edge of the holding pond had signs of erosion.
3. A consent order has been issued to the system to correct poor conditions found at the plant, including a leaking roof, cracked clearwell, and poor maintenance.
4. There was some new residential development close to the water plant, but appears to be outside of the source watershed.

E. WATERSHED CHARACTERIZATION

Source Water Assessment Area Delineation Method

An important aspect of the source water assessment process is to delineate the watershed that contributes to the source of drinking water. A source water protection area is defined as the whole watershed area upstream from a water plant's intake (MDE – SWAP, 1999). Delineation of the source water area was performed by using ESRI's ArcView Geographic Information System (GIS) software, utilizing existing GIS data, and by collecting location data using a Global Positioning System (GPS). A GPS point location was taken at the Rawlings Heights intake during the initial site visit and differentially corrected (for an accuracy of +/- 2 meters) at MDE. Once the intake location was established, the watershed was delineated based on existing MD Department of Natural Resources digital watershed data and MD State Highway Administration digital stream coverage. Digital USGS 7.5 topographical quad maps were also used to perform "heads up" digitizing, or editing, of watershed boundaries when needed.

General Characteristics

The Rawlings Heights watershed lies perpendicular to Dan's Mountain ridgeline and trends northwest to southeast. The 590-acre watershed drains Mill Run, which is composed of two small tributaries which have there springs spread over several acres along the eastern slope of Dan's Mountain between 1800-2000 feet msl.

Based on the Maryland Department of Planning's 1997 land use data, the land within the entire source water protection area (watershed) is as follows:

Table-1. Land Use

Land Use	Total Area in Acres	Percent of Total Watershed
Open Urban/Park	10.7	2
Forested	580.1	98

Forested land accounts for almost all the land use in this watershed. According to the DOP data, most of the watershed is characteristic of a deciduous forest, with trees losing their leaves at the end of the growing seasons. Tree species include oak, hickory, sycamore, birch, poplar, elm, and maple. Analysis of MD Department of Natural Resource aerial photography (DOQQS) for the watershed area shows that almost the entire watershed is forested. There are several areas that appear to clear of trees. Most are located along the borders of the watershed, with three on or near the top of Fox Hill. Aerial photographs of the region were taken in 1995, so these areas may be grown over at this time.

The Open Urban/Park land that is depicted in the DOP data is actually a golf course, which is **not** located within the source water protection watershed. Aerial photography clearly shows that the golf course is located outside of the watershed. DOP land use data pixel size is 30 square meters, so localized discrepancies sometimes occur.

Based on MD DOP 2000 digital Property View for Allegany County, there are only three property parcels in the watershed. A property breakdown is summarized below:

Table-2. Property Owners

Property	Type	Total Area in Acres	Percent of Total Watershed
Private	Private	22	4%
Dan's Mountain WMA	State	568	96%

Dan's Mountain Wildlife Management Area (WMA) is a 9,200-acre tract of land that runs along the slopes of Dan's Mountain. Five hundred and sixty acres of this WMA is within the source watershed, making it the highest percentage of state owned land in any of the source water protection watersheds within the state. The area is managed for its wildlife resources and is a popular hunting ground. The open areas depicted in aerial photography (see above) may be MD DNR primitive camping sites. According to a map of the WMA, an open area on the southern border of the watershed is a designated parking place for hunters, hikers, etc.

Localized Characteristics

Mill Run is buffered completely by forest above the intake. The holding pond is also surrounded by forest, except for one side that appears to be where the excavated material was piled. This sloped area has some vegetation growing, but appeared to have some erosion problems during the site visit. There are no recreational (hiking trails, etc.) or access roads immediately near the holding pond.

F. SOURCES OF POTENTIAL CONTAMINATION

Non-Point Pollution Sources

The Rawlings Heights watershed is completely forested, and consequently the intake is not threatened by non-point sources of pollution associated with residential, urban, or agricultural land use.

The Rawlings Heights watershed also lies outside of the Georges Creek Coal Basin, which extends up the western slope of Dan's Mountain. The source watershed is not susceptible to water quality impacts associated with coal mining.

State-owned land is occasionally harvested for its forest resources. It is not known whether logging has occurred in this section of the Dan's Mountain WMA. Improper forestry practices can increase the amount of sediment in streams (by erosion) and lead to increased turbidity and potential pathogen problems at water intakes. However, sale of timber on state land follows strict guidelines to ensure against environmental degradation. This includes minimizing the amount of erosion along logging roads and skid trails by employing conservation techniques, and prohibiting harvests within streamside buffers and on steep slopes.

The forest is well known for its wildlife. White-tailed deer, and turkey are hunted in the WMA; native wildlife can be a source of bacterial contamination in waterways.

Point Discharge Pollution Concerns
There are no point sources of pollution in the Rawlings Heights watershed.

Transportation Related Concerns
There are several recreational access roads in the source watershed. The main access road, referred to as Flats Road in DNR publications, runs southwest-northeast for almost a mile through the source watershed. Flats Road is an unimproved road that lies below the ridge of Dan's Mountain. According to USGS topographical maps there are several other unimproved access roads in the watershed. Runoff from these roads during storm events may contribute to erosion problems, but the likelihood of a major spill involving inorganic or organic compounds is minimal.

Land Use Planning Concerns
A comparison between 1990 and 1997 DOP land use shows no changes in the watershed. Recent residential development has encroached on the watershed, but still remains outside of the source protection area. It is unlikely that development will take place within the source watershed in the future because of its steep slopes and difficult access. Also, forested state property accounts for over 96% of the land in the watershed. According to Allegany County Water & Sewer maps (1997), land adjacent to the watershed on the eastern slope of Dan's Mountian is slated for sewer service, but the source watershed is not included in this planned area (Allegany County Water & Sewer Plan, 1997).

G. WATER QUALITY REVIEW

There is no known (to MDE) water quality data available for Mill Run above the intake. Available sources of water quality data that were reviewed for this assessment include MDE Water Supply Program's database for Safe Drinking Water contaminants, and United States Geological Survey data. Rawlings Heights water system is required to submit monthly operating reports that include some "raw water" data such as turbidity. However, because of inconsistent reporting and faulty equipment this data is not valid and will not be summarized in this review.

Regulated Testing
Rawlings Heights is required to test for regulated contaminants in its finished water supply from the water plant. A large number of these samples are collected by MDE and analyzed by the Maryland Department of Health Laboratory. This data is then reported to the Maryland Department of the Environment's Water Supply Program. Tests for Synthetic Organic Compounds, Volatile Organic Compounds, and Inorganic Compounds are required on an annual basis. Below are tables of detected compounds. For the following section, all samples are of finished water, unless otherwise noted.

Inorganic compounds (IOCs) include trace metals, radioactivity, and nutrients such as nitrate. They are tested annually in the finished water supply at Rawlings Heights, and are occasionally tested in the raw water, Mill Run. Below is a summary of IOC detections since 1993:

Table-3. *IOCs*

Contaminant	Sample Date	MCL (mg/L)	Result (mg/L)
BARIUM	03/25/01	2	0.033
GROSS ALPHA	06/16/00	15	2
GROSS BETA	06/16/00	50	4
NITRATE	02/07/94	10	1.4
NITRATE	09/17/94	10	0.4
NITRATE	12/20/94	10	0.9*
NITRATE	03/28/95	10	0.5
NITRATE	06/10/96	10	0.7
NITRATE	02/20/97	10	1.1
NITRATE	07/15/97	10	0.7
NITRATE	04/28/98	10	0.6
NITRATE	06/17/98	10	0.5
NITRATE	10/21/99	10	0.2
NITRATE	03/27/00	10	0.5*
NITRATE	03/27/00	10	0.5
NITRATE	03/19/01	10	1.1
NITRATE	04/19/01	10	0.9
NITRITE	06/10/96	1	0.002
NITRITE	07/15/97	1	0.002
pH	06/10/96	na	7.4
SULFATE	06/10/96	na	12.4
SULFATE	07/15/97	na	7.8
SULFATE	06/17/98	na	10.3

*Raw water sample

Volatile Organic Compounds (VOCs), which include organic solvents, chlorinated solvents, and petroleum derivatives have been tested annually in finished water samples since 1990. One detection has occurred during this time (see below). Compounds known as Trihalomethanes (THM) are the result of residual organic matter combining with chlorine during the disinfection process of water treatment.

Table-4. *VOCs*

Contaminant	Sample Date	MCL (mg/L)	Result (mg/L)
TOLUENE	01/26/90	1000	0.4
Trihalomethanes			
CHLOROFORM	01/25/95	na	1.7
BROMODICHLOROMETHANE	07/15/97	na	4
DIBROMOCHLOROMETHANE	07/15/97	na	2
BROMODICHLOROMETHANE	06/17/98	na	2.2

CHLOROFORM	06/17/98	na	17.3
BROMODICHLOROMETHANE	10/21/99	na	1.3
CHLOROFORM	10/21/99	na	12.2
BROMODICHLOROMETHANE	06/16/00	na	1.3
CHLOROFORM	06/16/00	na	11.2

Synthetic Organic Compounds (SOCs) are also tested annually in finished water supply. These compounds are usually used as pesticides. Below is a summary of detects since 1995:

Table-5. SOCs

Contaminant	Sample Date	MCL (mg/L)	Result (mg/L)
DI(2-ETHYLHEXYL) PHTHALATE	05/09/95	6	0.63
DALAPON	06/10/96	200	0.367
DALAPON	08/26/97	200	0.12
PENTACHLOROPHENOL	06/16/00	1	0.12
DI(2-ETHYLHEXYL) ADIPATE	06/16/00	400	0.6*b
DI(2-ETHYLHEXYL) PHTHALATE	06/16/00	6	0.7*b

* Raw water sample
b -Contaminant also found in sample blank

Source Water Assessment Bacteriological Sampling

MDE's Water Supply Program initiated a two-year bacteriological monitoring program for all surface water sources in the state to assist in the source water assessment. Sampling at the Rawlings Heights intake began on September 9, 2000 and have since been collected bi-weekly. Below is the data collected through June 2001:

Table-6. Bacteria

Date	Fecal Coliform (MPN/100ml)	E. Coli (MPN/100ml)
09/07/2000	30	54.6
09/21/2000	8	11.9
11/02/2000	1	4.1
11/16/2000	1	0
12/07/2001	2	6.2
12/21/2000	4	3.1
01/04/2001	2	0
01/18/2001	2	1
02/01/2001	1	0
02/15/2001	4	2
03/01/2001	1	0
03/15/2001	2	0
04/05/2001	1	0
04/19/2001	4	5.2

05/03/2001	500	365.4
05/17/2001	50	96
06/07/2001	2	0
06/21/2001	50	50.4
07/05/2001	30	43.5
07/19/2001	900	Lab Error
08/02/2001	110	45

USGS Monitoring Site 1599800

The United States Geological Survey (USGS) had taken water quality samples at this site in 1979 and 1980. The site represents the water quality of Mill Run at Rawlings, MD, and incorporates several other smaller streams outside of the source watershed. The site is approximately 1 river miles below the Rawlings Heights intake. Below is a summary of relevant data collected from the site by the USGS:

Table-7. USGS Data

Parameter	Mean Concentration mg/L	Max Concentration mg/L	No# of Samples
Dissolved Oxygen	11.2	14.6	6
Nitrate + Nitrite	0.46	0.65	2
Dissolved Sulfate	14.7	19	6
Dissolved Fluoride	0	0	3
Total Iron	0.176	0.32	6
Total Manganese	0.013	0.02	6

In addition to those parameters, pH was also tested six times and averaged 7.6 during the sampling period 1979-1980.

H. SUSCEPTIBILITY ANALYSIS

Each class of contaminants that were detected in the water quality data will be analyzed based on the potential they have of contaminating the intake on the river. This analysis will identify suspected sources of contaminants, evaluate the natural conditions in each watershed that may decrease or increase the likelihood of a contaminant reaching the intake, and evaluate the impacts that future changes may have on the susceptibility of both intakes.

Microbial Contaminants

Rawlings Heights is required to take total coliform samples from finished drinking water every month. These bacteriological samples are collected at points in the distribution system. It would be difficult to use this data for the assessment because it does not adequately give an indication of contamination in both raw water supplies. Because of this lack of data, raw water bacteriological monitoring began in September 2000 at the plant. Following is a statistical summary of the data shown in Table 8. All values are Most Probable Number (MPN).

Table-8. Bacteria Summary

Source	*# of Samples*	*Fecal Coliform*			*E. Coli*		
		Mean	Median	Max	Mean	Median	Max
Mill Run	21	81.2	4	900	34.4	3.6	365.4

Mean concentrations take into account random samples with high concentrations that are most likely due to increased runoff during storms. During a storm, erosion of land surfaces may increase, which in turn raises the amount of sediment and organic material in the water, leading to elevated bacteria concentrations. While higher concentrations of bacteria have been observed at the intake through the source water assessment project, median values of collected data show that bacteria concentrations are normally innocuous.

Since there are no anthropogenic sources of microbial contaminants in the watershed, sources must be limited to wildlife, and maybe to occasional human recreational activity (hunting & hiking).

The Rawlings Heights water system has not tested for the presence of *Giardia* and *Cryptosporidium* in the Mill Run water supply. It is believed that these two pathogens are fairly common in the surface waters of the United States. High turbidity can be an indicator for the presence of these and other bacteriological pathogens. Sources of contamination include human and animal waste. Water filtration does not always provide a 100% effective barrier against these organisms, especially the small *Cryptosoridium* oocysts.

Because of the steep slopes in the source watershed, Mill Run is subject to rapid runoff during heavy periods of rainfall and/or snowmelt, which can directly lead to increased concentrations of microbial contaminants. However, these events are limited and the data shows that concentrations are relatively low for a majority of the time. Mill Run may be susceptible to microbial contaminants during storm flow conditions, but is not susceptible during normal hydrologic conditions.

Turbidity and Sediment

Turbidity at the Rawlings Heights intake is generally low. Higher levels of turbidity in Mill Run can result from storm events (rainfall) and snowmelt, or both. There are several documented customer complaints of cloudy (turbid) water in the finished water supply after heavy rains. Excessively high turbidity can interfere with water treatment and carry harmful microorganisms into the drinking water supply. A review of plant data, which may be inaccurate, showed that raw water turbidity was usually less than 10 NTU. The small water plant has had trouble treating mildly turbid water in the past. The turbidity levels in Mill Run are not likely to pose a risk to a properly working water treatment plant; however, Rawlings Heights has experienced trouble in meeting finished water turbidity levels imposed by the Safe Drinking Water Act regulations.

With 98% of the watershed forested, significant runoff from storm events would not be expected. Isolated areas may contribute to the overland flow-erosion-sediment load cause and effect relationship. Field survey and analysis of land use and aerial photography point to

(current) potential sources of erosion from storm runoff. These include the natural erosion of stream banks, and runoff from access roads in the source watershed.

Future land use changes in the Mill Run watershed could increase the potential of turbidity contamination at the intake. Residential development or the extension of the golf course into the source watershed could increase runoff/turbidity. Mineral and/or forest harvesting on property in the watershed could also potentially increase runoff, and raise the potential for turbidity contamination in the stream. The state WMA provides a great benefit to the water quality of Mill Run but future management of the land should ensure that water quality is not compromised.

Because of limitation associated with the treatment facility at Rawlings Heights fluctuating raw water turbidity during storm events makes the water system susceptible to turbidity contamination. At the current time the Rawlings Heights water system is susceptible to turbidity contamination, based on turbidity increases during storm events and the plants inability to consistently deal with this mild increase.

Inorganic Compounds

- Nitrates

Nitrates can enter the water supply from fertilizer runoff, leaching from septic tanks, wastewater effluent, atmospheric deposition, and erosion of natural deposits. Although nitrates have been detected in the finished water supply, no samples have been close to the 50% MCL trigger. Levels of nitrate in Mill Run are not expected to be much higher than finished water results because a small filter plant, like Rawlings Heights, does not remove nitrates. $NO^{2'3}$ (Nitrite + Nitrate) data from the USGS water quality data on lower Mill Run was also significantly below 50% of the MCL.

Likely sources of nitrate in the source watershed include natural deposits and atmospheric deposition, with a possible contribution from animal waste. Nitrate levels would not be expected to increase in the future, unless development increases and/or land use changes in the watershed. At this time the Rawlings Heights intake is not susceptible to nitrate contamination.

Rawlings Heights received a waiver for nitrite testing after sampling results in 1995 and 1996 indicated that levels were well below the MCL of 1 mg/L. Nitrite and nitrate have the same potential sources of contamination. Nitrite is not a threat to contaminate Mill Run.

- Trace Metals

Regulated heavy metals are tested annually in the finished water produced at the Rawlings Heights plant, and since 1993 there has been a single detection. Barium, a relatively common heavy metal, was detected in 2001 at concentration of 0.033 mg/L, significantly lower than the 2 mg/L MCL and 50% trigger. Barium is most likely to be naturally occurring and does not pose a risk to the Rawlings Heights intake.

Iron and Manganese samples were taken by the USGS at the monitoring site on lower Mill Run. Average concentrations of these two elements were below the National Secondary

Drinking Water Regulations (NSDWR), 0.3 mg/L for iron and 0.05 mg/L for manganese. Iron an Manganese are common elements in western Maryland waters, and are usually associated with aesthetic and nuisance effects such as taste and odor problems and fixture staining, but are not necessarily public health concerns. Rawlings Heights does not test for these metals in the 'raw' water and customers have not expressed any concern of these metals causing taste and odor problems.

- Sulfate

Sulfate is not a regulated drinking water contaminant, but the NSDWR secondary standard concentration is 250 mg/L. Average sulfate concentrations from the plant is well below this concentration. According to the USGS, Sulfate can be good indicator of mining activity and acid or alkaline mine drainage (USGS Circular 1202, 2000). Regional background concentrations of sulfate from non-impacted streams were 20.8 mg/L according to the Allegany and Monongahela NAWQA study. USGS data from Mill Run and plant data concentrations are below this background threshold. This data along with the absence of any significant mining areas (abandoned or active) in the source watershed demonstrate that the intake is not susceptible to contamination associated with mine drainage.

- Radionuclides

Radionuclides have been detected once in the water supply, but were well below 50% of the MCL. Gross Alpha and Beta are tested once every four years in the Bloomington water supply. Without the presence of any natural sources, radionuclides are not expected to be at high enough levels to contaminate the Mill Run water supply.

- Other Inorganic Compounds

No sources of cyanide, asbestos, or fluoride, were found within the watershed. Fluoride was not detected in three USGS water quality samples. The Rawlings Heights intake is not susceptible to these contaminants.

Volatile Organic Compounds

A single VOC detect has been recorded in the Rawlings Heights finished drinking water since testing began in 1989. Toluene was detected in 1990, at a concentration several orders of magnitude below the MCL and 50% trigger. Toluene in the environment can be from such sources as motor vehicle exhaust and spills on land during the storage, transport and disposal of fuels and oils. With the absence of any other toluene detections, or any other VOCs, the Rawlings Heights water system is not susceptible to these types of contaminants.

Trihalomethanes (THMs) result from the reaction of naturally occurring organic matter with chlorine during the water treatment process. The most common THMs detected in the Rawlings Heights water supply are chloroform and bromodichloromethane. Currently, the EPA sets a MCL of 100 µg/L (ppb) for **Total** THMs, but this level is scheduled to change in 2001 and 2003. The new MCL for systems serving 10,000 persons or less is 80 µg/L (ppb) starting in 2003. This rule will apply to the Rawlings Heights system. Past THM samples were taken at the point of entry (water plant) to the water distribution system. The new MCL requires samples to be taken in the distribution system, so accurate comparisons of the old data and new MCL cannot be made. Total THM concentrations in the Rawlings Heights

water distribution system may be higher, however, past samples from the plant's point of entry are very low and concentrations are expected to be 50% below the future MCL.

Synthetic Organic Compounds

Four different SOCs have been detected in Rawlings Height's water supply since 1992, but results from all detects were below 50% of the MCL. Di(ethyhexyl)phthalate (DEHP) and Di(ethyhexyl) adipate are commonly found in plastics, and are classified as a probable human carcinogens by the EPA. The prevalence in plastics makes them a hard substance to sample and test. Because these compounds commonly appear in laboratory blanks, the reported quantities are not likely reflective of levels in the environment, but rather laboratory artifacts. Dalapon is a herbicide commonly used on right-of-ways and transportation corridors. Sources of dalapon may include transmission lines and transportation corridors in the watershed. However, the two detections of dalapon in the water supply were significantly less than the MCL of 200 ppb, and the 50% trigger. Pentachlorophenol was detected in a single sample in June 2000. The concentration of this compound was well below 50% of the MCL. Pentachlorophenol is mainly used in wood preservation (as a fungicide) but can also be used as a pre-harvest defoliant on some crops. Detections of SOCs have been uncommon and have always been well below the drinking water MCL, consequently, Rawlings Heights is not susceptible to these contaminants.

I. RECOMMENDATIONS FOR SOURCE WATER PROTECTION PLAN

With the information contained in this report the Rawlings Heights Water System is in a position to protect the Mill Run water supply by understanding the area delineated for source water protection (watershed), keeping track of potential contaminant sources, and evaluating future development and land planning. A source water protection plan for the Savage River is the underlying goal of this assessment. Specific management recommendations for consideration are listed below:

Form a Local Watershed Planning Team

- In order to protect the interests of the communities water supply, a watershed team should be formed which can include Rawlings Heights water officials, interested citizens, MD DNR officials in charge of Dan's Mountain WMA, and MDE.
- Goals of this group should include: increase citizen involvement in protecting the water supply, a tool for keeping up to date on changes in the watershed, and to promote watershed protection and possibly recreational opportunities.

Public Awareness and Outreach

- Future Consumer Confidence Reports need to provide a summary of this report and indicate that the entire report is available to the general public through their library, contacting the town office, or by contacting the Water Supply Program at MDE.
- Include interested members of the public on the watershed planning team.

Monitoring

- Continue to monitor for fecal coliform and/or E. coli in the reservoir after the two-year MDE sponsored monitoring program is over.

- Continue to monitor for all Safe Drinking Water Act contaminants as required by MDE, including raw water sampling when feasible.
- Monitor raw water turbidity during storm events and cease the stream diversion into the pond when turbidity increases in Mill Run.

Land Acquisition and Easements

- The availability of loans for purchase of land or easements for the purpose of protecting water supplies is available from MDE. Loans are offered at zero percent interest and zero points.
- Work with the MD DNR to promote forest preservation within Dan's Mountain WMA.
- Ensure that residential development and/or golf course expansion does not encroach within the source watershed

Contaminant Source Inventory Updates

- Rawlings Heights water personal can periodically conduct its own detailed field survey of the watershed to ensure there are no new potential sources of contamination.
- Update MDE on potential land use changes that may increase the susceptibility of the reservoir to contaminants.

REFERENCES

Allegany County, 1997. Allegany County Water & Sewer Plan 1997 Update. Allegany County Department of Planning, 28p. with maps.

Slaughter, Turbit H. and John M. Darling, MD Department of Geology, Mines, and Water Resources State of Maryland, 1962. Geology and Water Resources of Allegany County, 408p.

MD Dept. of the Environment, Water Supply Program, (MDE) 1999. Maryland's Source Water Assessment Plan, 36p.

United States Geological Survey, 1998. Water Quality in the Potomac River Basin 1992-1996, Circular 1166, 38p.

United States Geological Survey, 2000. Water Quality in the Allegany and Monogahela River Basins, PA, WVA, NY, and MD, 1996-1998. Circular 1202, 32p.

OTHER SOURCES OF DATA

- MDE Water Supply Inspection Reports
- MDE Water Supply reader file for Rawlings Heights (PDWIS ID – 0010030)
- MDE Water Supply Program Oracle® Database (PDWIS)
- Rawlings Heights Monthly Operating Reports (MORs) and Self-Monitoring Reports

- MD Department of Natural Resources Spot Satellite Images and Digital Orthophoto Quarter Quads.
- Digital USGS Topographic 7.5 Minute Quadrangles, SureMaps Raster.
- Maryland Office of Planning 1997 and 1990 Allegany County Land Use Map.
- Maryland Office of Planning 2000 Property View Tax Map, Allegany County.
- Water quality data from EPA's STORET database clearinghouse.
- EPA Chemical Fact Sheets, http://www.epa.gov/safewater/mcl.html
- USGS Water Quality Database, http://water.usgs.gov/nwis
- MDE – Lonaconing Quad, Digital Elevation Model
- MD Department of Natural Resources protected land GIS database

Table 11

Susceptibility Analysis Summary Table

Contaminant	*Water Quality* (50% MCL Exceeded?)	*Potential Sources*	*Natural Attenuation in Watershed*	*Evaluation of Change to Natural Conditions*	*Intake Integrity*	*Currently Susceptible?*
Volatile Organic	N	None	Y	P	N	N
Synthetic Organic	N	None	Y	P	N	N
Heavy Metals	N	Natural Deposits	Y	P	N	N
Nitrate/Nitrite	N	Natural Deposits	Y	P	N	N
Fluoride	N	Natural Deposits	NA	P	N	N
Cyanide	N	None	Y	P	N	N
Asbestos	N	None	NA	P	N	N
Radionuclides	N	None	Y	P	N	N
Total/Fecal Coliform	N	Wildlife	U	M	N	Y
Protozoa	I	Wildlife	U	M	N	Y
Viruses	I	Wildlife	U	M	N	Y
THMs	N	Organic Material	N	P	N	N
Turbidity	Y	Erosion	N	M	Y	Y

KEY:

Water Quality:
Y = Yes, data shows that a sample was greater than 50% of the MCL
N = No sample data was found above 50% of the MCL
I = Insufficient data

Potential Sources
(List of Sources that we deem important, point and non-point)

Natural Attenuation in Watershed
Y = Highly probable that contaminant type is attenuated under natural conditions in the watershed
N = Contaminant is not attenuated naturally in the watershed
U = Unknown

Evaluation of Change to Natural Conditions
N = Future changes in the natural conditions of the watershed will likely increase the susceptibility of this intake to the contaminant type
P = Future changes in the natural conditions of the watershed are **not** likely to increase the susceptibility of this intake to the contaminant type

Intake Integrity
Y = Intake is vulnerable, or adds to the susceptibility of contaminant type
N = Intake does not contribute to vulnerability of contaminant type

Currently Susceptible
Y = Yes
N = No