INFORMATIONAL BULLETIN

TREATING THE WELDON SPRING QUARRY WATER

The first of several steps in the environmental response action for the Weldon Spring Quarry is to remove and treat the water so that the bulk waste stored in the quarry can be removed.

This Informational Bulletin explains the process of treating the quarry water so that it can be released safely to the Missouri River. The treatment system consists of an equalization basin, a water treatment plant and two effluent ponds.

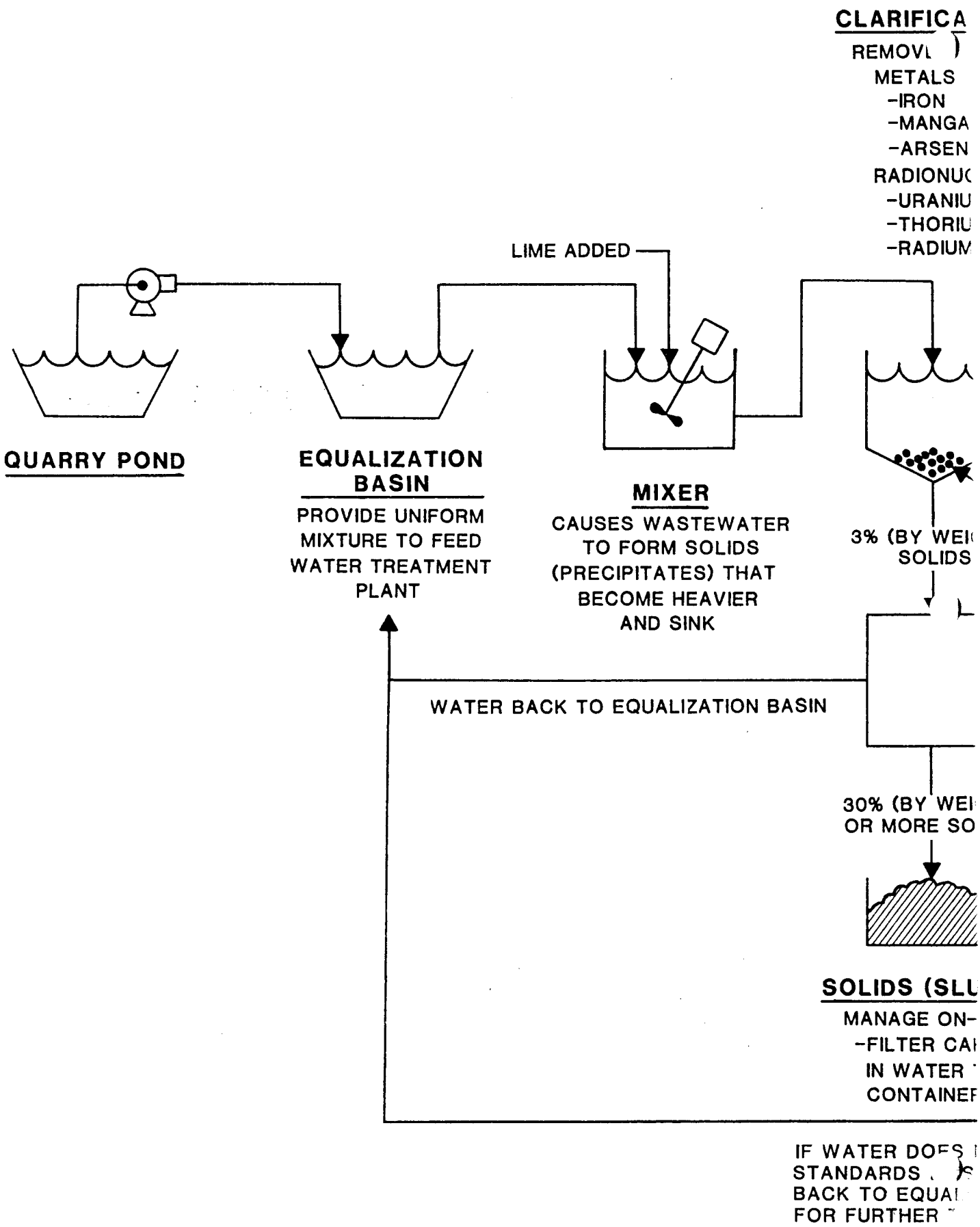
The U.S. Department of Energy (DOE) conducted bench-scale tests of this system using actual water from the quarry. The results of these tests confirmed that the system can effectively remove the contaminants

Continued on back page

This bulletin is for the people of St. Charles and St. Louis counties who are interested in the U.S. Department of Energy's treatment of contaminated surface water impounded in the Weldon Spring Quarry

DOCUMENT NUMBER: I-1400-1606-1.07

TREATING WATER AT TH



WELDON SPRING QUARRY

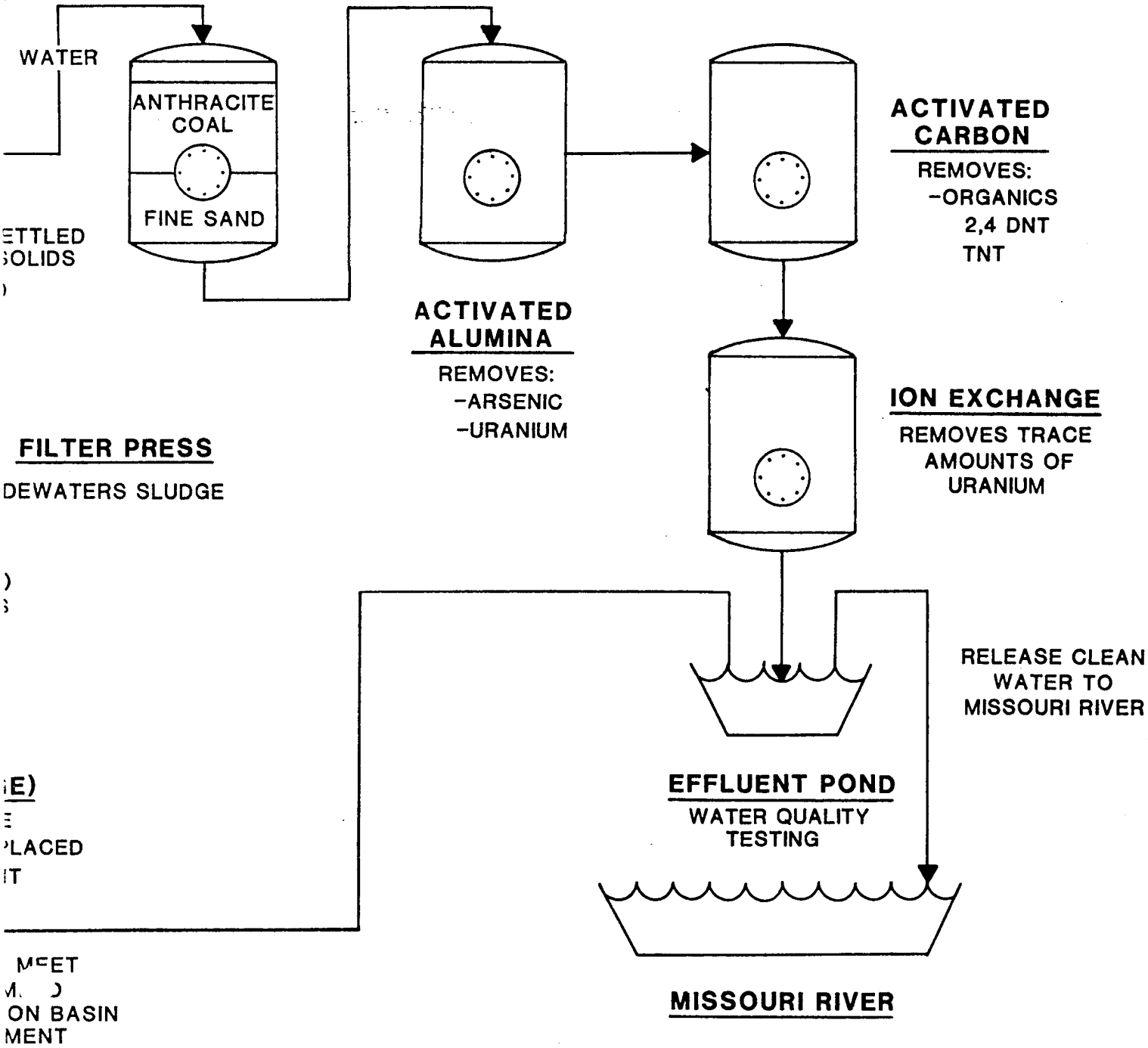
N

E

ES

MULTIMEDIA FILTER

REMOVES FINE SOLIDS THAT MAY HAVE BEEN CARRIED OVER FROM PREVIOUS STEP



E)

E

PLACED

IT

MEET

ON BASIN

MENT

QUESTIONS AND ANSWERS

Q: How can you be sure of getting a representative sample when you test the treated water?

A: We will collect samples of treated water from each corner of the effluent pond. These four samples will be mixed together to make one sample to be analyzed. This technique is widely used. It is like having a blood sample at the doctor's office. It is not necessary to take all of your blood to get an accurate analysis.

Q: How can radioactivity be removed from water?

A: Uranium and thorium are metals and have many of the same chemical and physical properties of other metals. The water treatment plant process takes advantage of these known properties to facilitate removal.

Q: How frequently and how long will treated water be released to the Missouri River?

A: About three times a month at first. The plant will be available for 10 years, but probably won't operate continuously.

Q: Can the water treatment plant operate in freezing weather?

A: All process equipment will be housed in a building that can be heated as required to maintain plant operations. The plant can operate at temperatures as low as 20 degrees F.

Q: How do you control accidental release of water to the river?

A: There is a two-key system requiring two operators to activate pumps to release treated water to the river.

Q: Do you monitor the river water downstream from the outflow?

A: Yes.

Q: How did the quarry water become contaminated in the first place?

A: The quarry was used as a dump for contaminated debris from Federal Government operations during the years 1942 through 1969. This caused the pollution. In the quarry cleanup, DOE is responding to the potential threat that contaminated water impounded in the quarry could reach the St. Charles County well field that supplies drinking water to homes and industry throughout the area.

DESCRIPTION OF TREATMENT PROCESSES

Equalization Basin - Water from the quarry is pumped to the equalization basin. This basin serves as a reservoir to provide consistent flow and uniform contaminant concentration to the water treatment plant.

Mixer - This process involves the addition of lime. The lime reacts with the metals and radionuclides to form precipitates. This precipitate mixture is rapidly transferred to the clarifier.

Clarifier - Clarification is the process that allows the precipitate mixture to settle. The solids settle to the bottom and are drawn to the filter press for dewatering. Clarification takes place when 95% or more of the contaminants in the water are removed. The clear water at the top of the clarifier moves to the multimedia filter. The concentrated precipitates are transferred to the filter press.

Filter Press - The filter press forces the concentrated precipitates that have settled in the clarifier through a small pore filter cloth. This process removes a large portion of the water and forms the resulting "filter cake." The water that is removed is directed back into the equalization basin to be treated again. The filter cake is then placed into large watertight containers to be safely managed at the chemical plant area.

Multimedia Filter - The multimedia filter removes fine particles that did not settle out in the clarifier. These suspended solids represent less than 0.001% of the total solids. The filter contains anthracite coal that removes the larger suspended solids before they reach the fine sand media. The sand then removes the very fine suspended solids. Once the water has been through the multimedia filter, all suspended solids will have been removed. This step is necessary to remove particles that would otherwise clog processes further downstream.

Activated Alumina - Activated alumina is a powdery granular material that binds primarily to arsenic and to some incidental uranium. Activated refers to the process by which the alumina is manufactured (heating). This process has been included into the system to act as a polishing unit. Any arsenic not removed by the previous steps will be removed here.

Activated Carbon - Activated carbon is a dry granular material used to remove organic substances from water or air. The water from the activated alumina process is passed through the activated carbon unit. Most organics, including nitroaromatics (2,4 - DNT and TNT), chemically and physically bind to the carbon thereby removing them from the water.

Ion Exchange - Ion exchange is a process to remove trace amounts of uranium from the water. The uranium is attracted to a specially selected resin much like iron is attracted to a magnet.

Effluent Ponds - The effluent ponds contain the treated water. There are two effluent ponds, each with the capacity of one million gallons. It takes approximately eight days to fill a pond (Design Flow Rate is 80 gallons per minute). When one pond is filled, flow is diverted to the other pond while the first pond is being tested to ensure it meets the water quality standards set forth by the State of Missouri. Once verified that it meets these standards, the water is discharged to the Missouri River.

TREATING THE WATER

Continued from front page

of concern. Because the quarry water contains both radioactive and chemically hazardous materials, the water treatment plant was specifically designed to remove all of those components. The bench-scale testing successfully removed metals (iron, manganese and arsenic), radionuclides (thorium, uranium and radium) and nitroaromatics (2, 4-dinitrotoluene[DNT] and trinitrotoluene[TNT]).

The treatment process is intentionally redundant. Consecutive steps are incorporated to treat the various contaminants. For example, each of the five major steps--lime mix, clarification, multi media filter, activated alumina and ion exchange--is aimed successively at the ever-diminishing amounts of chemicals and radioactive materials.

The DOE will not release any batch of treated water to the river unless the analysis indicates the water has been treated to permissible levels. Each batch of treated water is chemically analyzed to confirm compliance with the requirements of the National Pollutant Discharge Elimination System (NPDES) permit. The testing procedures comply with both Environmental Protection Agency (EPA) and State of Missouri regulations.

These analytical procedures include an extensive data verification and validation program to make sure that the results of laboratory analyses are performed correctly.

Additional copies of this bulletin are available from the Community Relations Office at the Weldon Spring Site Remedial Action Project. Telephone (314) 441-8086.

DEPARTMENT OF ENERGY
WELDON SPRING SITE REMEDIAL ACTION PROJECT
7295 HIGHWAY 94 SOUTH ST. CHARLES, MISSOURI 63304
(314) 441-8086