

ABSTRACTS FOR TECHNICAL PAPERS FROM 2009

ENVIRONMENTAL STRESSORS FROM BEYOND THE CARIBBEAN ANTILLES: NATURE, EXTENT AND IMPACT

By
Carl-Axel P. Soderberg

Abstract

Many studies have been performed to identify and quantify the sources of pollution within the Caribbean Antilles, such as inventories of industrial discharges, generation of domestic solid wastes, percentage of the population served by sanitary sewer systems and in situ systems, percentage of domestic sewage that receives some degree of treatment prior to discharges, among others. However, little attention has been given to environmental stressors originating outside of the Caribbean Antilles and their impact on our Public Health and our environment.

This paper will discuss the sediment and nutrient loads into the Caribbean Sea from the non-insular Caribbean. The processing and transport of oil from the non-insular Caribbean will also be discussed. Other environmental stressors from beyond the Caribbean included in this paper are the Sahara dust, invasive species and climate change.

EFFECTS OF INORGANIC ANIONS ON FENTON TREATMENT OF LANDFILL LEACHATE

By
Yang Deng and Edualberto Rosario Muniz

Abstract

Municipal landfill is the primary solid waste disposal method in the United States and throughout the world. However, landfill leachate produced during landfilling, without appropriate treatment, may seriously threaten the natural environment and public health. Recently, Fenton process has been widely studied to remove organic pollutants through chemical oxidation from leachate. However, this method only provides moderate chemical oxidation demand (COD) treatment efficiency and low increase in biodegradability. This study is to investigate the effects of nitrate (NO₃⁻), sulfate (SO₄²⁻), and chloride (Cl⁻) on COD reduction during Fenton treatment of landfill leachate under different experimental conditions. Comparison of COD removal using different acids for pH adjustment prior to Fenton oxidation demonstrated that the inhibiting effects of these anions on COD removal followed the order: NO₃⁻ < SO₄²⁻ < Cl⁻. At [H₂O₂]:[Fe²⁺] = 3, [H₂O₂] = 397 mM, and pH = 3.0, NO₃⁻ at 6,118-50,000 mg/L and SO₄²⁻ from 0 to 10,000 mg/L slightly decreased COD removal by 3% and 8%, respectively. At [H₂O₂]:[Fe²⁺] = 3, 2.125H₂O₂:COD₀ = 9.0, and pH = 3.0, COD removal efficiencies for the Cl⁻ levels of 1270, 5000, and 10000 mg/L were 67%, 58%, and 48%, respectively. After Cl⁻ originally present in leachate (1270 mg/L) was completely removed by

precipitation due to formation of solid AgCl after addition of AgNO₃, COD removal was increased to 96%.

These results showed that Cl⁻ played a primary role in inhibition of Fenton oxidation, probably because chloride could largely compete with leachate organic species for hydroxyl radicals, to form less reactive radicals, and also compete with hydrogen peroxide to complex Fe (III) to form Fe (III)-chlorocomplexes, thus hindering the formation of hydroxyl radicals via Fenton chemistry pathway. Therefore, the overall COD treatment efficiency may be substantially improved if appropriate pre-treatments for Cl⁻ removal are used prior to Fenton treatment.

PLASMA ARC GASIFICATION FOR SOLID WASTE DISPOSAL UPDATE ON ST. LUCIE COUNTY, FLORIDA PROJECT

By

E. J. Grotke, Leo J. Cordeiro

Abstract

Plasma arc gasification is an emerging technology for generation of renewable energy and other by-products from a variety of waste. This bold technology is under development in a number of locations around the world, although it is too early to fully know if the technology is technically feasible and economically viable on a truly heterogeneous municipal waste stream like that found in the U.S.

Plasma arc technology in the United States in other applications dates back approximately 40 years when it was utilized by NASA to test heat shield materials for spacecraft. In 1989, plasma arc technology was used in an iron melting furnace in Defiance, Ohio (USA). Plasma arc gasification has been used in municipal solid waste destruction since 1999 in Japan for destruction of solid waste and automobile shredder residue. Plasma arc gasification heats waste materials to temperatures in excess of 10,000 degrees Fahrenheit (°F) to break the molecular bonds and gasify the materials.

This liberates the energy potential of the waste materials and melts the residue to an inert, glass-like slag, which may be used as an aggregate in construction and manufacturing operations. If this market can be developed, it will significantly reduce the need for landfill disposal in the future.

St. Lucie County, Florida (USA), is in the process of negotiating with a developer for the construction of a plasma arc gasification facility that will process 600 tons per day of municipal solid waste. The facility may be the first large scale solid waste plasma arc processing facility in the United States. Camp Dresser & McKee is assisting St. Lucie County to negotiate the agreements for this project. The project is expected to be privately financed, so the County will not be putting any money at risk.

In this paper, we will describe the plasma arc technology, present its historical applications, and discuss the St. Lucie project from initial conception to its current status.

LANDFILL LEACHATE TREATMENT SOLUTIONS TO OPTIMIZE ENVIRONMENTAL PROTECTION IN THE CARIBBEAN

By
Linda Y Dudley

Abstract

The major issues relating to the practice of solid waste disposal by landfill are well documented and understood within the industry. The Caribbean region like other regions in the world share concerns regarding the decline in available landfill capacity and the impact of the landfill degradation on our environment. It is a priority to control the seepage of leachate from landfills and to prevent the contamination of land and groundwater close to the landfill areas.

This paper highlights the major concerns regarding landfill pollutants and their potential impact on our environment particularly due to the generation of leachate. The treatment processes selected for landfill leachate are dependant on the discharge requirements of the local legislators and the anticipated composition and flow of the leachate itself. A strategic approach is now being adopted in many countries in the region to follow 'best practice' and incorporate new processes to protect our fragile environment.

Conventional and 'state of the art' technology will be briefly outlined and the benefits of new approaches to landfill design and management using membrane technology as a final leachate polishing step will be highlighted.

ENVIRONMENTAL EDUCATION IN WASTE MANAGEMENT

By
Sian N. Cuffy

Abstract

Environmental Education is a field that has received both widespread attention and on the other end of the spectrum, very little attention. With the onset of many environmental projects coupled with changes in the waste management sector, it has now become crucial to inform the public of the intended works or changes to an established system. It is with this milieu in mind that the appropriate development and effective execution of a public education/awareness campaign will be presented. Huckle (1991) characterizes environmental education as socially critical since it empowers persons to participate in a democratic transformation of society. His view complements developments in the cognitive sciences which reveal that meaningful learning can take place when persons construct their own learning by participation, reflection and practice. Here the tool of Community-based Social Marketing can be utilized where the community at large facilitates the desired behaviour change. The issues of waste minimization and source separation can be integrated into an education plan where one of the main goals with specific reference to waste management is the reduction in the quantities of waste entering the landfill site.

This approach argues that the hope for the resolution of solid waste problems lies in increasing the ecological literacy of our general populace and empowering them to

investigate, make clear decisions and take the necessary actions in relation to solid waste issues.

PERFORMANCE ASSESSMENT OF ONSITE WASTEWATER TREATMENT SYSTEMS IN THE CAYMAN ISLANDS

By
C. Crabb

Abstract

A paper presented at the 2003 Annual Caribbean Water and Wastewater Association Conference: “*Onsite Wastewater: Here to Stay, How to Manage?*” discussed the Cayman Islands’ development of an Onsite Wastewater Management Programme. This paper reviews the current Programme with emphasis on a performance assessment of onsite treatment systems.

Approximately 20% of wastewater generated in the Cayman Islands is collected and treated at the central wastewater treatment plant operated by the Water Authority; the remaining 80% is treated in onsite treatment systems comprised of approximately 13,500 septic tanks and 520 aerobic treatment units. All treated wastewater effluent is discharged to effluent disposal wells. Septic tanks serve the majority of developments constructed prior to 1990 as well as smaller developments constructed since that time. Aerobic treatment units are required at larger developments, as the systems are designed to achieve a higher level of treatment (secondary) than can be achieved by a septic tank alone (primary treatment).

In 2003 a basic performance assessment was carried out which found that 20% of installed onsite aerobic treatment units were inoperable. In April 2008 a quantitative assessment of onsite treatment systems was initiated. This paper discusses results from 200 aerobic treatment units and 50 septic tanks which were sampled and analyzed for five-day Biochemical Oxygen Demand (BOD5) and Total Suspended Solids (TSS). Overall, only thirteen per cent of the systems sampled met the Cayman Islands’ effluent limit of 30 mg/L for both BOD5 and TSS. The results of the assessment are further analyzed by technology type, operational status, capacity of system, age of system, and type of development served.

The performance assessment of onsite treatment systems, which is ongoing, provides the empirical data necessary to advance the Cayman Islands’ Onsite Wastewater Management Programme.

CONDITION ASSESSMENT AND PRIORITIZATION OF SANITARY SEWER REHABILITATION IMPROVEMENTS IN THE CITY OF MIAMI BEACH, FL

By
Dornelle Thomas, John Schroeder and Jason Johnson

Abstract

The City of Miami Beach, Florida, is a volume sewer customer (VSC) of Miami-Dade Water and Sewer Department (MDWASD). As such, the City must comply with the requirements set forth in Miami-Dade County's Volume Sewer Customer Ordinance (VSCO) 96-166. In order to satisfy one component of the VSCO, the City completed the Sanitary Sewer Evaluation Survey (SSES). The SSES project is comprised of several phases, including Phase I: System Flow Monitoring, Phase II: Sanitary Sewer Evaluations, and Phase III: Rehabilitation. The system flow monitoring plan and report presented the flows for all of the City's sewer basins. The results of Phases I and II identified seven basins that exceeded the County-mandated maximum allowable infiltration criterion of 5,000 gallons per day per inch diameter mile (gpd/idm).

The purpose of this paper is to present the existing conditions of the City's sanitary sewer system; discuss the identification of potential sources of infiltration and inflow (I/I); and outline the prioritization strategy for immediate repairs, rehabilitation, replacement, inspection, and maintenance to reduce I/I.

This paper presents an overview of the common causes of sewer system problems; how instances of these common problems were identified during the study; and how the technological tools used, combined with the data collected, have yielded the City an easy to apply, prioritized action plan for evaluating and rehabilitating their infrastructure problems to reduce the wet-weather flows beneath the 5,000 gpd/idm for all basins.

**WASTEWATER MANAGEMENT
A COLLABORATIVE APPROACH TO UPGRADING TO LIMITS OF
TECHNOLOGY AT THE YORK RIVER TREATMENT PLANT**

By

I. Venner, J. Husband, J. Noonan, A. Nelson, D. Waltrip

Abstract

In response to rapid population growth as well as to address the nutrient reduction goals for the Chesapeake Bay established by the Virginia Department of Environmental Quality (VDEQ), the Hampton Roads Sanitation District (HRSD) initiated the York River Treatment Plant (YRTP) Expansion Phase 1.

The existing YRTP is a conventional step-feed activated sludge plant and is rated for an average daily design flow of 15 million gallons per day (MGD). This project proposes to expand the existing treatment capacity to 30 MGD and to reduce the nutrients discharged to the York River, a tributary for the Chesapeake Bay.

In order to meet the effluent limits set by the VDEQ, a treatment upgrade to limit of technology (LOT) or enhanced nutrient removal (ENR) was required.

Malcolm Pirnie worked with HRSD and the VDEQ to develop and evaluate ENR process alternatives to achieve the required effluent limits with the goal of determining the most reliable and cost effective alternative to achieve the aggressive nutrient reduction goals. This paper will highlight the key issues in determining the most desirable treatment process considering both economic and non-economic factors.

NITROGEN REMOVAL OPTIMIZATION AT THE CITY OF CLEARWATER MARSHALL STREET ADVANCED POLLUTION CONTROL FACILITY

By

Ifetayo Venner, Samuel A. Ledwell, Jack Sadowski, John Milligan

Abstract

The City of Clearwater, Florida operates the Marshall Street Advanced Pollution Control Facility (MSAPCF). The plant has a design capacity of 10 MGD annual average daily flow (AADF) and annual average effluent permit limits of 3 mg/L total nitrogen (TN) and 1 mg/L total phosphorus (TP). MSAPCF has a long history of successful nitrogen removal performance. However, low CBOD5 to Total Kjeldahl Nitrogen (TKN) ratios, diurnal loading variations and occasional spikes in influent nitrogen loading made optimizing denitrification performance difficult. The City is currently in the construction phase of a project to upgrade the process air system. The existing diffusers will be replaced with new fine bubble diffusers and the process air blowers will be replaced.

This requires that tanks be taken out of service to replace the existing diffusers and droplegs. The denitrification capability of the facility limited the number of tanks that could be taken out of service at a time, lengthening the estimated construction schedule. The City of Clearwater decided to investigate whether the addition of a nonhazardous supplemental carbon source would allow the facility to optimize its denitrification performance; giving operations staff more flexibility in responding to diurnal load variations and spikes, as well as potentially allow more tanks to be taken out of service at a time during construction, thereby potentially decreasing the construction schedule.

An evaluation of supplemental carbon sources was completed and included a thorough survey of performance, deliverability, safety, ease of implementation, chemical cost and capital outlay requirements (storage and feed system). Ultimately, MicroCg™ was selected as the supplemental carbon source and was implemented at the MSAPCF in February of 2008. After successfully piloting the product, the City decided to also use MicroCg™ at the Northeast APCF and continues to use supplemental carbon to trim effluent nitrate-nitrogen in the anoxic zones.

OPPORTUNITIES FOR UV DISINFECTION SYSTEM OPTIMIZATION THROUGH DESIGN AND PERFORMANCE EVALUATIONS

By

Randall Booker, Mercedita Monserrate

Abstract

At the request of the Puerto Rico Aqueduct and Sewer Authority (PRASA), CPM-MPPR Infrastructure Managers, PSC and Malcolm Pirnie, Inc. conducted a review and assessment of UV disinfection system installations and their performance at two existing PRASA wastewater treatment plants (WWTPs). In addition, we evaluated design documentation for UV disinfection systems at two other PRASA WWTPs currently under construction. The objectives of this project were 1) to identify opportunities for improvements in the design and specification of future UV disinfection systems at PRASA WWTPs, and 2) to evaluate operational and maintenance issues at the existing UV disinfection systems and make recommendations for improved performance.

Evaluation of the two currently operating UV systems included review of operating records, inspection reports, Discharge Monitoring Report (DMR) data, operations and maintenance manuals and records, original design criteria and documentation, site visits and interviews with operations personnel. In addition, the design and performance of processes upstream of the UV equipment, such as filtration, were evaluated due to the fact that feed water quality controls UV system performance.

Assessment of design documentation for the two UV disinfection systems under construction included evaluation of engineering and basis of design reports, technical specifications, drawings, construction shop drawing submittals and site visits. In addition, the design bases for upstream processes were also evaluated. Final recommendations were grouped in the following categories: 1) Operations and Maintenance Recommendations; 2) System Design Recommendations; 3) Installation Acceptance Testing and Training Recommendations. Operations and maintenance recommendations focused on feed water quality monitoring, equipment failure frequency, channel level control, disc filter performance and control of flow pacing of UV system output. System design recommendations focused on weather protection for equipment, channel and power supply redundancy, and equipment for continuous feed water quality monitoring. Finally, specific contract requirements for UV system third-party validation, acceptance and performance testing and operator training were recommended.

WASTEWATER DISINFECTION ALTERNATIVES IN THE CARIBBEAN: A COMPREHENSIVE EVALUATION

By

Randall Booker, Mercedita Monserrate, Adamaris Quiñones

Abstract

A comprehensive evaluation of disinfection alternatives was performed for the Barceloneta Regional Wastewater Treatment Plant (BRWWTP), a secondary treatment facility owned by the Puerto Rico Aqueduct and Sewer Authority (PRASA) and located on the north central coast of Puerto Rico in the city of Barceloneta. The average and peak design flows for the new disinfection system are 12 MGD and 22 MGD, respectively. The BRWWTP currently does not perform effluent disinfection and there are no existing facilities or equipment for disinfection at the plant. With no existing facilities to weight the consideration of one disinfection technology over others, and no significant footprint restrictions, the opportunity was presented to evaluate a wide range of alternatives on the basis of predicted disinfection performance, technical advantages and disadvantages, capital and life-cycle costs, and health and safety considerations.

The evaluation was supported by supplemental data collection and bench-scale testing for critical disinfection-related parameters. Five disinfection technologies were screened in the preliminary evaluation: chlorine with sulfur dioxide dechlorination; sodium hypochlorite with sodium bisulfite dechlorination; chlorine dioxide with dechlorination; ozone; and UV light. After evaluation of each alternative, chlorine/sulfur dioxide, sodium hypochlorite/sodium bisulfite, and UV light were selected for the final evaluation. Detailed design criteria and a conceptual design and layout were developed for each of the three alternatives. Based on these conceptual designs, construction and O&M cost opinions, as well as life cycle costs, were further developed for each alternative. With the

lowest costs and lowest health and safety risk, as well as a high potential for public acceptance, a vertical LPHO UV light disinfection system was recommended as the preferred alternative for design.

PROVIDING AN INNOVATIVE DESIGN-BUILD-OPERATE (DBO) WASTEWATER SOLUTION FOR THE U.S. VIRGIN ISLANDS

By

William Harless, Francis P. Crehan

Abstract

The design-build-operate (DBO) approach has been gaining considerable favor over the past decades as an approach to implement time-critical projects and also deliver cost savings to the owner when compared to the conventional design-bid-build approach.

VWNA Caribbean, a subsidiary of Veolia Water North America Operating Services, LLC (Veolia Water), worked with the Government of the U.S. Virgin Islands to implement a DBO approach for the two new 4-million gallon per day sequencing batch reactor wastewater treatment facilities, as part of a comprehensive solution to the wastewater management needs of the island communities of St. Thomas and St. Croix. The project was driven by the need to meet the requirements of a 1996 agreement with the U.S. Environmental Protection Agency (EPA) concerning ocean discharge. The design/build phase work included responsibility for all aspects of facility design and construction for the two new facilities. As a part of the design, Veolia Water was responsible for obtaining all required governmental approvals, from site preparation to environmental compliance.

This presentation will take a look at the DBO approach as it has been applied to governmental projects in the Caribbean and elsewhere, and will provide a case study for the successful application of this approach for Virgin Islands.

SOLVING THE WATER SHORTAGE OF NEVIS

By

Roland Hoag

Abstract

In 2007, the Nevis Island Administration (NIA) contracted with BEAD, LLC to supply groundwater to supplement the existing island's potable water supply under a Build Own Operate Transfer (BOOT) contract. The exploration program resulted in the successful addition to Nevis' existing water supply of approximately one and a half million imperial gallons per day (1.5 mgd) of excellent quality groundwater from three production wells drilled and developed by BEAD.

The geology of Nevis is very complex with a history of volcanic activity over a 3.5 million year period. The most recent volcanic eruption occurred approximately

100,000 years ago. In geologically young volcanic terrane, such as in Nevis, aquifers capable of providing large amounts of water to production wells are found in buried channels that have been filled with volcanic debris and/or lava flows from more recent volcanic eruptions. Because these aquifers can be hundreds of feet deep with no geological or visible surface expressions, such as outcrop indicators or the presence of springs, a combination of geologic reasoning and deep profiling geophysical techniques are often employed before drilling for additional water resources. In Nevis, several kilometres of geophysical resistivity profiling were acquired in order to identify these deep subsurface aquifers.

The production facilities at each production well are equipped with variable frequency pumping systems in order to conserve electricity while easily meeting the daily demand for water delivery to the distribution system. Moreover, each pump house is equipped with a meteorological station designed to gather information to assist in the estimation of the total sustainable groundwater potential of the island, as well as to safely monitor the impacts of water extraction from each well. The types of data that are collected at each pump house include: water levels in the delivery storage tank and wells, pump motor voltage, precipitation, air temperature, wind speed, pumping rate and numerous other

DRIP, DRIP, DROUGHT: PLANNING FOR AND REDUCING NON-REVENUE WATER (NRW) IN A WATER-THIRSTY REGION

By

Jed JohnHope, Charles Lambert, Gary Trachtman, and Michael Wooden.

Abstract

While successfully delivering quality water supplies for generations, the water industry in the United States has often done so with uncertain accountability controls, reflected in significant losses of both treated drinking water (mostly from leakage) and revenue (due to inaccurate metering, billing, and unauthorized consumption). Since water resources have been subjected to intense competition, regulatory and regional planning agencies have mandated that water suppliers manage water resources with a greater sense of stewardship and efficiency than in the past. In recent years, water suppliers have undertaken water loss audits to quantify water efficiency and assist with their planning efforts. A water loss audit traces the flow of water from the site of withdrawal, through the water distribution system and into customer taps, in order to address two fundamental questions:

How much water is lost (physically and apparently)?

And, how much are these losses costing the utility?

This paper discusses the water loss audit process recently employed for DeKalb County, Georgia, whose water distribution system contains over 2,500 miles of mains and whose, 740,000 residents consume approximately 78 MGD. Results of the audit, a “path forward” for achieving identified objectives, lessons learned, challenges encountered implementing water loss audit recommendations, and best practices for water loss audit

preparation are also presented. It is important to note that north Georgia, which includes DeKalb County, experienced a two-year drought from late 2007 to June 2009, which accentuated the need for this water loss audit.

**APPLICATION OF SURFACE GEOPHYSICS FOR PROVIDING A DETAILED
GEOTECHNICAL ASSESSMENT OF A LARGE RESORT DEVELOPMENT
SITE IN ANGUILLA, BWI**

By

Sandy Nettles, Bret Jarrett, and Eric C. Cross.

Abstract

N.S. Nettles & Associates (NSN) has completed extensive geophysical investigations that have guided engineering practices for a resort community in Rendezvous Bay, located in Anguilla, BWI. Located in a modern carbonate depositional environment, the project site is characterized by surficial and sub-surface karst features that were of concern to the geotechnical engineer for structural stability issues and proper design criteria. Diverse technologies were used including Multi-Electrode Resistivity (MER), Continuous Resistivity Profiling (CRP), and Multi-channel Analysis of Surface Waves (MASW). Resistivity techniques allowed for differentiation of geologic units and the identification of karst features and sub-surface anomalies. To determine sub-surface density variability, MASW transects were performed. This multi-method approach provided confidence in the location of anomalies that were later targeted for drilling practices. Borings, including Standard Penetration Tests (SPT), Cone Penetration Tests (CPT), and rock cores were used to investigate anomalies and calibrate the geophysics.

Additionally, a stagnant salt pond was mapped using CRP and MER to determine unconsolidated sediment thickness and the competency of underlying limestone. Results provided accurate volume calculations for dredging, the first phase in the transformation of the hypersaline pond to a functional marine habitat. Combined results have provided the geologic framework for engineers to implement a successful construction strategy for the Rendezvous Bay Resort.

**WATER SUPPLY INVESTIGATIONS USING SURFACE GEOPHYSICS –
TOOLS FOR DELINEATING AQUIFERS SYSTEMS AND FRESH/SALT
WATER INTERFACES**

By

Sandy Nettles

Abstract

Ocean Earth Technologies (OET) utilized Multi-Electrode Resistivity (MER), a nearsurface geophysical method, to delineate a fresh water lens available for water supply on the island of Anguilla, BWI. MER provides a non-invasive technique to map geologic features and delineate aquifer systems. The nature of the resistivity test also allows for high resolution analysis of changes in the conductance of an aquifer unit, thereby providing a tool with which to delineate the fresh-salt water interface. OET conducted a comprehensive geologic mapping of a proposed resort development in Anguilla, BWI, using MER technology. The initial purpose of the mapping was to identify geologic

anomalies that would be problematic for the construction of the resort buildings and to delineate the salt water aquifer. During the mapping process, a fresh water lens was identified on the property. The lateral and vertical extent of this lens suggested that it could be utilized as a secondary fresh water supply source for small local facilities on the property. OET initiated a more focused MER mapping program to further delineate the lens of fresh water. Subsequent to the geophysical mapping, several monitor wells were constructed to ground-truth the MER data and obtain conductivity measurements of the aquifer system. The conductivity measurements confirmed the presence of the fresh water lens, and helped to further define the depth and extent of the fresh water system. The MER and well data were used to construct a detailed hydrologic system design for the property, including the limited utilization of the fresh water lens, the construction of salt R/O water supply wells, reject wells and a comprehensive storm water drainage and recharge system. The geophysical approach to this hydrogeological evaluation provided a tool that identified an otherwise unrecognized water supply source for this project and the surrounding area.

SMALL FILTRATION AND DISINFECTION UNIT FOR A POINT OF ENTRY CISTERN WATER PURIFICATION

By

Sangchul Hwang, Daniel Concepcion, Juan Falcon

Abstract

Nearly 1.8 million people die every year due to diarrhoeal diseases (including cholera) in developing countries, 90% of which are children under five years. In the Caribbean, 77% and 37% of urban and rural populations, respectively, had access to improved drinking water, whereas 20% of the urban and 44% of the rural population did not have access to basic sanitation. Therefore, the need clearly exists to provide adequate water supply and sanitation to small, rural communities. A proof-of-concept study has been conducted to test feasibility of the drum filtration and disinfection unit to be a point-of-entry (POE) cistern water purification unit (CPU) for rainwater. This study was based on an experimental drum filtration and disinfection system that has been installed and operated in a rural community to treat surface water. A POE CPU consisted of a gravel filter followed by a sand filter and disinfection unit. Biochemical characteristics of the effluent such as turbidity, pH, electric conductance, total and free residual chlorine concentrations, and indicator microorganisms were monitored.