Integrated Water Services, Inc.

Fall 2008

IWS Completes First East Coast Project in South Carolina

Although the initial geographic focus for IWS has been the Western US, we recently completed our first East Coast project in South Carolina, with more projects in the pipeline. In April 2008, IWS completed construction of the wastewater treatment facility at Cane Creek Motorcoach Resort in northwest South Carolina, located on the shores of environmentally sensitive Lake Greenwood. This was one of the first commercial centralized AdvanTex treatment systems permitted and constructed in South Carolina.

Cane Creek Motorcoach Resort

Project Overview

Cane Creek Motorcoach Resort is a new Class A motorcoach destination in South Carolina. The facility has over 80 spaces and includes a club house with a heated swimming pool. Due to the environmentally sensitive Lake Greenwood and State of South Carolina regulations, the owner was obliged to implement an advanced wastewater treatment system to serve the project.

continued on page 5

IWS First Design-Build Project in Oregon Nears Completion

Contract Award

IWS was awarded a Design-Build contract by the Sundown Sanitary Sewer District (SSSD) in Astoria, Oregon in January 2008 to replace their existing wastewater plant to meet new Oregon DEQ discharge requirements for the facility under their National Pollutant Discharge Elimination System (NPDES) permit. SSSD was operating under a Notice of Violation by the ODEQ for discharge issues and needed to meet a tight deadline for upgrading the plant. IWS was

continued on page 8

SSSD facility prior to upgrade

SSSD facility after upgrade was completed

IWS Makes Memorial Day Possible for Zuma Beach in Malibu, CA

Challenging Schedule

IWS was awarded a construction contract under the direction of Los Angeles County to install an onsite wastewater treatment system at the Zuma Beach complex in Malibu, CA to be completed before the critical Memorial Day weekend kick-off to the summer beach season. IWS had 60 days from the execution of the contract to construct and start-up the system.

A Team Effort

IWS worked closely with the prime contractor, SBS Corporation, and their Project Manager, Robert (RJ) Stump, to coordinate field activities and manage the various deliverables required to mobilize to the field. Steve Braband of Biosolutions, Inc. (Agoura Hills, CA) provided equipment and technical support as well as ongoing operation and maintenance services. The system was designed by Los Angeles County Dept. of Public Works and inspected by LA County.

IWS drainfield installation at Zuma Beach

Construction Scope

Three of the County restroom facilities, operated by Beaches & Harbors, were previously designed with septic tanks and leach fields, with no secondary treatment or disinfection. IWS's scope of work included securing each of the three locations with safety fencing, removing the exiting primary treatment tanks, and installing an Advanced Onsite Treatment System at each location. The following includes the project totals provided (all three facilities):

- Three 15,000 gallon septic tanks
- Three 10,000 gallon recirculation tanks
- One 8,000 gallon grease interceptor
- Six Orenco Advantex AX-100 Packed Bed Filters
- Three leach fields
- Relocation of the parking lot entrances to allow for construction of new leach fields
- Electronic control and remote monitoring system
- Three UV disinfection units
- System testing and start-up

IWS shoring and dewatering of excavation to install tanks

Construction/Site Challenges

IWS was required to restrict access to each of the facilities during the course of the project and worked with LA County and the City of Malibu to secure the site and communicate the status of the project to the public. The

beach remained open during the course of the construction effort and IWS maintained public access to the beach areas and managed all the vehicle traffic coming into and out of the site during the construction.

Critical Schedule

To complete the project in the limited time allowed, IWS mobilized the project resources so that work could proceed at all three sites in parallel. The success of the project required rigorous scheduling to complete construction by the mandated completion date - Memorial Day Weekend, 2008. Alex Villarama, P.E. the LA County Project Engineer said, "IWS completed the work in a safe and professional manner and was able to mobilize the manpower and project resources to meet our difficult time schedule". ●

IWS installing forms for concrete covers on tanks

Dangerous Bacteria in UNM Hospital Water System Eliminated

IWS Teams with MIOX

In August 2008 IWS completed the installation of an innovative disinfection system (Miox SAL 40) which is being used to eliminate the deadly *Legionella Pneumophila* bacteria from the University of New Mexico Hospital's (UNMH) water system in Albuquerque. IWS fast-tracked the project to meet the critical schedule for the new wing of the hospital.

Deadly Bacterium

Results from water samples taken after flushing the water lines in a new wing of the UNMH in November 2007 turned up bacterium that could cause severe infections. Two of 32 randomly tested faucets in the new wing tested positive for *Legionella Pneumophila* which can cause pneumonia from Legionnaires' disease.

Potential Cause

Construction of the new west wing of the UNMH was completed in late 2007. During construction, the west wing's new water system was turned on for testing and then shut down for at least six months before being turned on again for normal operations. It is suspected that standing water in the pipes during the prolonged shut-down period developed legionella bacterium.

The IWS-Miox Team

MIOX Corporation (www.miox.com) is an Albuquerque, NM based provider of innovative disinfection technology that replaces the need to purchase, transport, and store dangerous chemicals. MIOX is used in over 30 countries and in hundreds of communities across the U.S. for public drinking water systems, water reuse projects, and a variety of commercial and industrial applications. IWS teamed with MIOX to provide a turnkey solution to the hospital on a fast track basis to meet the critical project schedule.

The Miox Technology

IWS installed two MIOX SAL 40 mixed oxidant generators to treat the UNMH's potable water supply system and the water for the hospital's HVAC cooling system. MIOX water treatment equipment is capable of efficiently removing biofilm and hazardous microbes by generating a mixed oxidant solution from ordinary table salt. The end result is similar to the customary addition of chlorine to the potable water supply.

continued on page 4

However, the MIOX process uses technology that electrolyzes salt to generate chlorine disinfectant which eliminates the hazards associated with transporting, storing, and handling dangerous chlorine.

Future Opportunities

IWS and MIOX are pursuing opportunities throughout the US where clients can leverage the MIOX disinfection technology for other applications and projects. ●

The Miox SAL 40 at UNMH installed in the hospital's utility room

Turn-key Sustainable Project in Pristine Arizona Desert

Design-Build

IWS recently completed a sustainable project for the development of a low income residential subdivision in the mountainous desert of Bullhead City, AZ overlooking the Colorado River. The developer, Adams Construction and Management Corporation (Adams) of St. George, Utah needed a construction firm that could collaborate with their civil engineering consultant to provide a turn-key wastewater solution for the second and third phases of the project.

Sustainable Goals Met

One of the goals of the treatment system was to protect the pristine desert environment. IWS utilized an Advantex treatment system in conjunction with Geoflow drip irrigation to meet the regulatory discharge requirements and the client's need for subsurface discharge of the wastewater.

IWS tank installation in foreground

System Design

The treatment system was designed to handle 12,500 gallons per day (expandable to 24,000 gallons per day) of domestic wastewater from 103 housing units. The system design included the following: a) Five AX-100 Treatment Units; b) Two, 25,000 gallon and one, 20,000 gallon primary tanks; c) One, 15,000 gallon dosing tank; d) One 25,000 gallon re-circ tank; and e) 20,000 square feet of drip irrigation. The wastewater treatment system was permitted under a type 4.23 Aquifer Protection General Permit which allows flows up to 24,000 gallons per day.

Project Execution

Adams schedule required that the final design and construction be completed within 90 days from notice to proceed. IWS worked diligently with Aqua Engi-

continued on page 5

neering to complete final design details for tanks and treatment equipment locations as well as drainfield layout and design. IWS also worked with Todd Christianson of Premier Environmental Products, LLC (www.premierenv.us) of Pine, Arizona who is the Orenco representative for Arizona. The Xerxes tanks were provided by Sunbelt Industries, Inc. (www.sunbelt-reps.com) of Phoenix, AZ. Paul Durr of Adams said, "IWS was able to quickly take over the project from the permitting phase, expedite resolution of the outstanding design and constructability issues, and complete construction of the system to meet our schedule and budget". ●

IWS preparing to install geoflow drip irrigation with vibratory plow

Treatment system area after installation completed

IWS Completes First East Coast Project *continued from page 1*

IWS Saves Client Cost

IWS worked closely with the engineer during the design process to provide constructability analysis and optimize material selection. The close collaboration between IWS and the engineer substantially reduced the cost of the treatment system.

IWS setting Xerxes treatment tank

IWS Teams with Local Service Providers and Suppliers

To help reduce overall construction costs, IWS teamed with a local excavation contractor. IWS provided all other manpower and resources for the construction of the project. IWS also worked with Lowell MacNutt of Coastal Carolina Wastewater Solutions, LLC (www.ccwastewater.com) who is the Orenco dealer for South Carolina and was the supplier of the treatment equipment for the project.

System Design/Configuration

The AdvanTex treatment system was designed to handle 7,500 gallons per day. The system will dispose of effluent by utilizing spray irrigation on an adjacent field. Collection and Treatment system components included:

- STEP Collection System for over 80 RV Spaces
- Three AX-100 Orenco Treatment Units
- Xerxes 10,000 gallon Recirculation Tank

Orenco treatment pods and detention pond

- Xerxes 5,000 gallon Wet Well
- Retention Pond
- Spray irrigation and associated piping

Successful Project

IWS was able to respond quickly to meet the clients needs in terms of schedule and budget. The owner, Mel Weaver said of the project, "IWS did a great job and completed the project on schedule and within budget". ●

IWS and Worrel Team Up to Design-Build First Living Machine® in California

Project Overview

IWS partnered with Worrell Water Technologies, LLC (WWT) of Charlottesville, Virginia to complete the Design-Build of the first *Tidal Wetland Living Machine® System* (Living Machine) in California at the Esalen Institute (Esalen) located in Big Sur, CA in January of 2008. The project resulted from Esalen's search for a sustainable solution for its onsite wastewater needs that would integrate into its campus and philosophy.

Overlooking the Pacific Ocean from Esalen Campus in Big Sur

The Living Machine

Living Machine systems are decentralized wastewater treatment systems that mimic processes found in wetland environments. The WWT patented technology uses mechanical and computer systems to enhance natural biological processes to treat wastewater. Living Machine systems provide a natural approach to wastewater treatment for communities, industries, academic institutions and government agencies. Using less energy than many other onsite wastewater treatment systems, Living Machine systems provide tertiary treatment, allowing the water to be reused for numerous applications including irrigation, toilet flushing, and wash water. Living Machine systems are frequently integrated into larger water reuse systems to increase water conservation, minimize wastewater surcharges, and meet operational requirements.

The Living Machine integrated into the Esalen campus

Esalen Institute

Esalen is a non-profit organization that has been devoted to the exploration of human potential since the 1960's. Historical luminaries like Aldous Huxley, Joseph Campbell, Jack Kerouac, Allen Ginsberg, Joan Baez, and countless others have gathered there to develop revolutionary ideas, transformative practices, and innovative art forms. Today Esalen is a retreat center where people come to attend educational seminar in a communal setting. Esalen Institute, renowned for its healing natural hot springs, has long been recognized as a world leader in alternative and experiential education. Now in its fifth decade, Esalen offers more than 500 public workshops and seminars a year, accenting personal growth and social change, in areas traditionally neglected by mainstream institutions.

Project Background

The Esalen campus original wastewater design utilized septic tanks discharging to traditional leachfields. Over time, some leachfields have failed and

remaining leachfields are at risk of failure with untreated septic tank effluent with no replacement area available. Esalen looked at a variety of wastewater technologies, but settled on the Living Machine after considering sustainability, cost, discharge quality, aesthetics, and other factors important to their mission. The IWS and WWT team was selected to design and build the wetlands system based on past project performance.

System Design

The system was designed by Worrell Water Technologies under direction of Senior Engineer, David Maciolek, P.E. and included pressure dosed leachfields. IWS designed the drip dispersal system. Design flow was 7,000 gallons per day average flow with expansion capacity. The system included the following:

- The Living Machine was constructed on sloping terrain and is composed of six concrete wetland cells, contoured and colored to conform to the natural terrain. The cells are filled with a special aggregate media resting on an underdrain system. Cell surfaces are planted with native wetland type plants.
- The system was designed and built to accommodate a phased expansion of the facility and the treatment system. Future treatment capacity is expected to accommodate an additional 7,000 gallons per day of other onsite waste streams.
- 500 linear feet of drip irrigation for landscaped areas with expansion planned.
- Pressure dose leach field to accept treated wastewater under a driveway area.
- Buried Fiberglass Tanks - 5,000 gallon Effluent Tank and a 10,000 gallon Primary and Equalization Tank.
- Computer control system with internet communication providing automated alerts, performance monitoring and remote control access for operators.

The Living Machine Concrete Wetland Cells

Project Challenges

The treatment system was constructed in the middle of the beautifully landscaped campus that had no room to spare. IWS provided security fencing and supported Esalen in establishing thoroughfares so that access to the Lodge, where most events and meals take place, was unrestricted. Esalen is a working and educational facility, set apart for not only learning, but for spiritual enrichment. IWS was sensitive to those requirements and our project team minimized interference with staff, students, and guests. The site for the Living Machine was adjacent to the organic garden, which provides much of the produce for the facility dinning operations. IWS was able to complete the construction with minimal impact to the gardening operations.

Big Sur is a classic California Coastal environment, with heavy winter rains. IWS completed much of the work during the rainy season, which required erosion control and management. Additionally, IWS installed cutoff trenches to allow heavy runoff to be diverted around the Living Machine and tied into Esalen's storm drains.

As with many IWS projects, Esalen is in a relatively remote location, which means that planning and scheduling are critical. Material and equipment supplies were more than an hour away. WWT supplied ready- to-install electromechanical components including all pump stations, valve arrays, and controls system. IWS planned the project carefully and worked closely with Esalen staff to insure minimum disruption. WWT provided engineering support to streamline the project and assure maximum quality.

Successful Project

The Design and Construction of the project was a success, and was implemented on schedule and budget. Jake Hesse (Director of Operations) said "IWS was very responsive to our needs and worked well with our organization and personnel in completing the project on schedule and without disruption to our ongoing operations and programs at Esalen." WWT provided comprehensive start-up and operator training services including extended operations support. ●

contracted by SSSD to meet the deadline under a Design-Build contract.

Project History

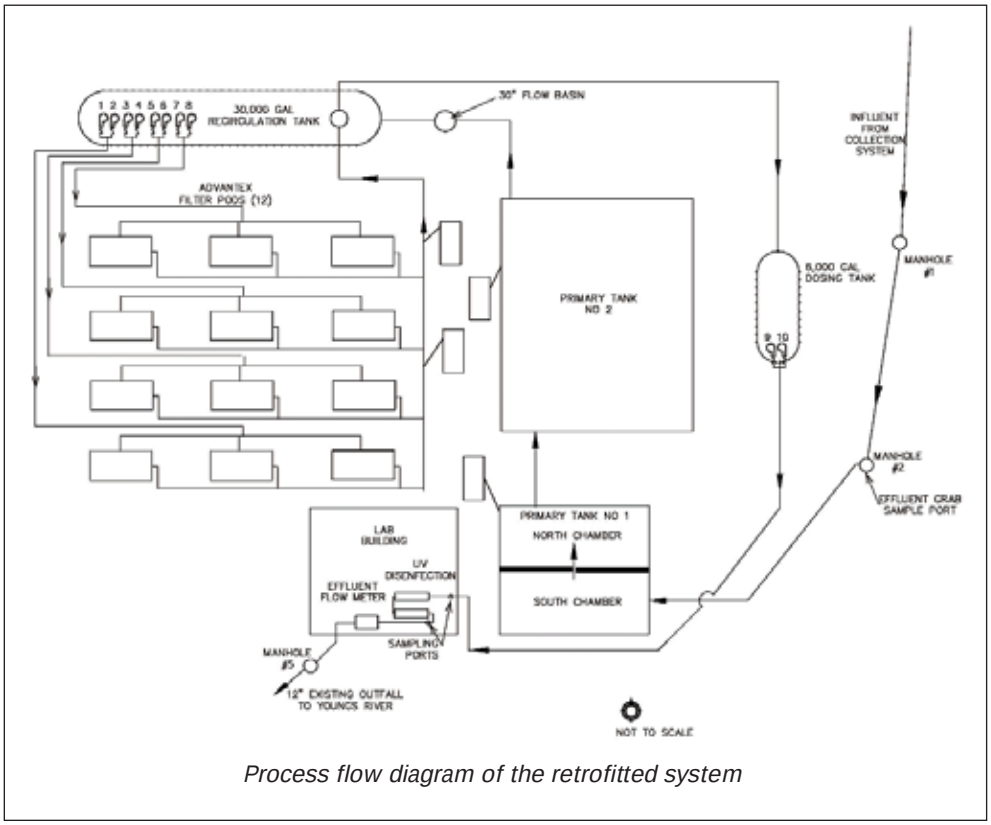
The original SSSD facility was constructed during World War II in the mid 1940's to service a hospital and related housing units being built to house anticipated casualties from the US invasion of Japan. The site was later developed in the 1970's by a private owner into a subdivision which includes 85 residential and 39 apartment units. The average daily flow from the development is 22,000 gallons per day. The existing plant had a digester building, an aeration basin, a clarifier, sludge drying beds, and a chlorine contact chamber. In addition, the client addressed collection system infiltration issues to minimize impact to the treatment system.

The IWS Solution

IWS developed a cost effective design by utilizing existing components wherever possible. Operating the existing system while making modifications to the structures proved to be a bit of a challenge, however, with careful planning and execution, IWS was able to incorporate all modifications to the new system without taking the existing system off-line.

The design includes the following components and approach:

1) IWS utilized the existing clarifier and aeration tank as primary treatment tanks. The tanks were inspected and deemed to be in operable condition. Reusing the existing concrete basins allowed the client a substantial cost savings.
2) IWS installed the following new treatment system components:
   a. 30,000 gallon recirculation tank
   b. 6,000 gallon dosing tank
   c. Cover for concrete aeration basin
   d. 12 - AX-100 Advantex Recirculation Pods along with auxiliary equipment
   e. UV Disinfection System
   f. 60kw standby generator
3) Discharge remained the same under the NPDES permit with the treated effluent being discharged into Young's River.



Process flow diagram of the retrofitted system

Current Status

IWS will complete construction of the system in the fall 2009 and make the switch over to the newly configured plant. IWS is projected to complete the permitting, engineering, and construction of the project from start to finish within nine months of the signed design-build contract. The design-build contracting vehicle enabled the project to proceed quickly and meet the compliance schedule required by the ODEQ. ●

Installation of treatment system

IWS Helps Keep Critical Regional Hospital Online

IWS completed construction of the renovated and greatly expanded onsite wastewater system at Feather River Hospital (FRH), located in Paradise, CA in January 2008. The new system will accommodate flows of up to 40,000 gallons per day and was designed to meet the needs of the facilities five year expansion plan. FRH now has one of the largest Orenco Advantex treatment systems in California. Work was completed by IWS while the hospital remained in full operation.

The Feather River Project Team, left to right: Russ Erickson (RD), Frank Sousa (RD), Steve Gonsolves (NMR), Dale Hemstad (IWS), Jay Alman (IWS), Ron Seale (IWS), Carole Mickelson (FRH), Chris Hartman (Jensen Precast)

A Team Effort

IWS worked closely with a variety of stakeholders which included the Owner (the Adventist Health System), FRH Administration, architect (Steve Gonsalves of Nichols, Melburg & Rossetto (NMR) - Chico, CA), engineer (Russ Erickson of Robertson & Dominick (RD) - Chico, CA), the Town of Paradise, Jensen Precast (Chris Hartman and Bill Beck), Orenco (Tristian Bounds), and Xerxes (Bill Robins). IWS assisted with constructability reviews and worked through critical logistics, such as planning our work to accommodate the needs of the operating hospital and allowing access for emergency personnel, equipment, and vehicles during construction.

Construction Challenges

The entire construction area was on a steep slope, which required extensive grading. The area is known for its high rainfall, buried boulders, and soils that are very slick when it rains. All of these challenges were present, as construction was completed during the winter and heavy rains made erosion, runoff control, and excavating more challenging. The project included over 10,000 linear feet of pressure dosed drain field, which magnified the site challenges.

New drainfield undergoing squirt test

Logistics Challenges

The onsite system is located on the campus of an operating hospital, requiring all construction to be completed in compliance with the California Office of Statewide Health Planning and Development (OSHPD) requirements. The OSHPD requirements not only impacted the construction, but also a) plan review and approvals; and b) site controls - maintaining access for all emergency vehicles, parking for all facility personnel, and no down time for any of the facility's utilities during the switch over from the existing waste-

IWS setting large fiberglass tanks (40,000 gallon) in treatment area

water system to the new system constructed by IWS.

Schedule

IWS coordinated construction activities with Carole Mickelson (Project Manager for FRH) and John Derrick (Assistant Director of Plant Services at FRH) to assure adherence to schedule. IWS worked as well with other contractors handling different aspects of FRH facility expansion. The logistics for working in a hospital environment were different from most projects, with consideration for critical care equipment access. Carole Mickelson of FRH said "IWS did an excellent job and the systems performance has exceeded all our expectations".

The IWS Scope of work included the following:

- Tree, stump removal, and re-grading of the treatment and tank areas with approximately 2,300 cubic yards of native fill to meet new grades and site configuration.
- Installation of five, 40,000 gallon fiberglass tanks, including three septic tanks, a recirculation tank, and a dosing/clarifier tank.
- Installation of a new 20,000 gallon grease interceptor tank, installed in-line to handle the cafeteria and kitchen wastes.
- Construction of 10,000 lineal feet of new pressure dose leach lines in a

Treatment area being completed

Orenco AX-100 pod open for inspection

hilly and sloped terrain and several thousand feet of new sanitary sewer force mains.

- Slip Lining of approximately 4,470 lineal feet of existing leach lines, with 1-1/2 inch PVC pipe
- Construction of the treatment system which included 21 Orenco Advantex AX-100 pod's with room for expansion of up to nine treatment pods.
- Construction of approximately 1,200 lineal feet of new 6" sanitary sewer lines to convey the wastewater from the hospital to the upgraded treatment system. This included installation of manholes, trenching, new bedding, piping, site restoration, and asphalt repair.
- Construction of approximately 700 feet of 12" storm drain and new drop inlets to control and divert the storm flows to by-pass the treatment area.
- Construction of a retaining wall and cobble lined ditches to provide structural and aesthetic elements to the overall treatment area.
- Construction of an access road and installation of security fencing.
- Construction of a treatment system building to house all the electrical controls and service associated with the new treatment system. ●

The completed treatment system after a dusting of snow

Company News

Peter C. Balas, PE (COO) of IWS was elected to the National Onsite Wastewater Recycling Association (NOWRA) Board of Directors.

Rainwater Harvesting Analysis – IWS recently completed a comprehensive rainwater harvesting analysis for an international firm which evaluated capital cost, water savings, and other ROI factors. For more information on rainwater harvesting please contact Peter Balas at pcbalas@integratedwaterservices.com

East Coast Market - IWS completes its first East Coast project at Cane Creek Motorcoach Resort in northwest South Carolina.

Oregon Market – IWS completes its first Design-Build project in Oregon at the Sundown Sanitary Sewer District in Astoria.

IWS and DBIA – IWS supports the Design-Build Institute of America and will continue participating in upcoming conferences and seminars.

AB885 Contest – IWS sponsored a contest at the recent annual California Onsite Wastewater Association (COWA) Conference for participants to guess the date of final AB885 (new onsite regulations in California) adoption. The winner will receive some great California wine.

Job Opportunities at IWS

IWS is seeking experienced Project Managers and Field Superintendants to support our growth in the West and Southeast. Please contact Gwen Rogers at grogers@integratedwaterservices.com for more information.

About Us

Integrated Water Services, Inc. (IWS) provides services to municipalities, developers, communities, and businesses to address their water and wastewater needs. IWS leverages its extensive experience in permitting, engineering, construction, project management, site development, and project finance to provide a range of services to its clients with the ultimate objective of providing a solution that meets all the stakeholders' needs. IWS teams with engineering firms, consultants, suppliers, and other contractors to provide the client best value for their specific project needs.

Corporate Information

Please visit our web site (www.integratedwaterservices.com) for additional information or contact us at the following locations:

West Coast (California, Oregon, Washington)

Peter C. Balas, PE
PO Box 10273
Pleasanton, CA 94588
Tel: 925-895-3895
pcbalas@integratedwaterservices.com

Jay Alman
2555 Lewis Drive
Sebastopol, CA 95472
Tel: 707-291-5283
jalman@integratedwaterservices.com

Southwest (Arizona, Colorado, New Mexico, and Utah) and Southeast (Alabama, Florida, Georgia, Mississippi and South Carolina)

Jeff Thomas
1225 Teakwood Drive
Fort Collins, CO 80525
Tel: 720-221-4366
jthomas@integratedwaterservices.com

Dave Patton
PO Box 9570
Avon, CO 81620
Tel: 720-207-5052
dpatton@integratedwaterservices.com

Integrated WATER Services, Inc.

PO Box 9570
Avon, CO 81620