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Executive Summary, Advanced Environmental Solutions, Inc.

The water used in your home requires treatment. You have agreed to pay \$25,000 for a project. We believe we can meet your need for \$15,000 with a monthly service charge of \$44.75.

Compare decentralized (our “at home”) with the industry determinations of any other decentralized or centralized system by what comes out of the treatment of pollutants as Organic solids (“BOD”), Total Suspended Solids (“TSS”), and Nitrates (urine) in milligrams per liter (“mg/l”):

	AT HOME		:	OTHER SYSTEMS NOT AES		
	BESTEP 900 - 2008	BESTEP MINI 1995	:	Tertiary Treatment	Secondary Treatment(x)	Primary Treatment
BOD	<5	5 ^a		<10 ^b	10<x<30	>30
TSS	<5	5		<10	10<x<30	>30
Nitrate	<3.9	3.9		<10	10<x<30	>30

A rating of under 10 mg/l means the water quality is no longer deemed a pollutant. The water leaving BESTEP RECLAMATORS CAN NOT BE CLASSIFIED AS DISCHARGING POLLUTANTS.^c

The MINI BESTEP 10 has been upgraded with a membrane to guarantee a water quality comparable to creek water cleanliness. That means the RECLAMATOR produces an alternative, sustainable water source.

LOCSO will evaluate treatment alternatives for eliminating pollutant discharges to less than 7 mg/l. Comparing costs of installation, operating and maintenance or user fees, and the intangible costs of disruption of traffic, power lines, and water & gas services:

	Installation	Service Costs per month	Street Tears and Traffic	Power Line Interruption	Water & Gas Line Interruption
BESTEP 900	<\$15,000	\$45.75	none	none	minimal
*additions	\$200-700				
Community Sewer Facility	Estimated \$70,000*	unknown	Major	Medium	Medium

^a Previous studies contracted to National Sanitary Foundation, (“NSF”) International used the design of the RECLAMATOR’s predecessor, the MINI from test data 1995. Nitrate levels average 3.9 mg/L.

^b The national standard for total nitrates is 10 mg/L for both the maximum contaminate level goal and the actionable standard as set forth under EPA guidelines pursuant to disinfection byproducts.
<http://www.epa.gov/safewater/contaminates/index.html>, page 5 of 15.

^c See 33 U.S.C.S. 26 Section 1362 (16), as agreed upon by the California Department of Public Health for water re-use in either aquifer recharging or subsurface irrigation. Advanced Environmental Solutions, Inc. continues to being seek additional non-potable, skin contact re-uses of your water coming from the RECLAMATOR as tertiary standards have been exceeded.

* BESTEP 900: subsurface irrigation options rather than standard aquifer recharge. Also, reuse of water in toilets may soon become available from the California Department of Public Health.

* Community Sewer Facility: The first phase of construction requires \$25,000. Additional phases will bring the total cost to an estimated \$70,000 per household.

Primary treatment by septic is no longer an option as the total nitrates Los Osos has established is 7 or less as the total nitrates acceptable. This defines what the public agency targets in awarding a construction project.

California Public Contract Code Section 20111 defines the requirement by law that the public agency in charge will award us the bid as the lowest responsible bidder. We have established our fitness, quality and capacity to perform the proposed work satisfactorily^d.

As for sludge, our system has 1/5 the total amount as removal in production is once in 5 years compared to every 15 days, typically, in centralized sewer systems. An advanced proprietary chemical removal process all associated sludge into a clean and pathogen free ash which will be sold as a soil enhancement product.

The RECLAMATOR uses less energy than any other competitive onsite alternative and less than half of a conventional public works project. The costs to you per home for the project in place per month is 1-2 Kw/h per day or about \$5 more in electricity per month. The clean out every 5 years is similar to a septic pump out now.

Electronic monitoring will be centralized to determine system service requirements 24/7. NSF International has agreed to be our monitoring services provider nationally. User fees include normal wear and tear, but not if utilizing the system outside the specifications as set forth in the operations manual.

We will share net proceeds with the homeowners of Los Osos if LOCSO agrees to the public-private partnership agreement which could enable further federal and state government funding by way of demonstration project grants.

United States Code Title 33, Chapter 26, Sec. 1317 requires pretreatment which means treatment of domestic waste water before that source of toxic pollutants, such as nitrosamine (see US EPA Toxic Pollutant List), leaves your property. The RECLAMATOR provides pretreatment which produces creek clean water not needing further treatment. A collection lateral is not necessary and not economically justifiable as the RECLAMATOR pretreatment process meets all state and federal treatment standards.

^d The State of California Registered Civil Professional Engineer, Selvan D. Paul, has stamped his approval of our project for AES Central Coast Discharge Elimination Company, LLC covering Los Osos CSD. No. 063537 exp. 9/30/08.



**Advanced
Environmental
Systems, Inc.**

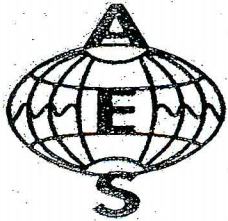
THE “RECLAMATOR INNOVATIVE ALTERNATIVE”

1.0 INTRODUCTION

AES, as a private organization, has private funding necessary to facilitate the Los Osos areawide waste management plan as required per USC 33§1281, providing the advanced innovative alternative technology (treatment works) as required per USC 33§1288 and meeting all cost effectiveness requirements of the selected alternative as required by USC 33§1297 and 33§1298. The advanced innovative alternative of AES provides the requirements criteria as defined in USC 33§1311, 1312, 1313, 1314 and 1316, producing a reclaimed/purified permeate, i.e. water, which represents “the greatest degree of effluent (waste water) reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives (BADCT, which refers to an onsite pretreatment alternative and not publicly owned conventional sewer collection and treatment), including, where practicable, a standard permitting no discharge of pollutants”. The quality of permeate or “new water” produced by the “RECLAMATOR” meets the United States Environmental Protection Agency’s (USEPA) Maximum Contaminant Level Goal (MCLG), the national standard which defines the quality of treated drinking water* quality of a public drinking water resource, a non-enforceable public health goal. (NOTE: Permeate produced by the RECLAMATOR is not intended for use as drinking water.)

The RECLAMATOR represents the ultimate household “water conservation” device (or “appliance”). As such, The RECLAMATOR reclaims/purifies 100% of a household’s water usage, allowing for 100% of all household water usage to be available for 100% original consumer beneficial reuse/recycle applications as desired. The permeate water produced by the RECLAMATOR, as defined by the California Water Code, Section 13050, is a valuable resource.

The RECLAMATOR is part of the AES comprehensive program for water pollution control. AES has given due regard to development of such technology



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which would enable AES to initiate a viable, sustainable and affordable alternative as an improvement necessary to conserve navigable waters, ground waters and improve the sanitary condition of surface and underground waters by eliminating the pollution into such waters. Additionally, to conserve withdrawal of such water supplies for public drinking water supplies as is mandated by USC §1252 (a).

The RECLAMATOR is part of a service provided by AES as a method of reducing total flow of sewage and unnecessary water consumption in order to reduce the requirements for, and the costs of sewage and waste treatment services. The "discharge elimination services" supported by AES utilizing the RECLAMATOR device or system is a private program which provides a method capable of achieving the maximum reduction of unnecessary water consumption in regards to consumer water usage as is mandated as per statute USC §1254 (o) (1).

This advanced innovative alternative technology has been demonstrated to biologically eliminate the discharge of pollutants, i.e. nitrates 1.6 mg/l average and total nitrogen 3.9 mg/l average. It meets all requirements for federal grant issuances as defined in USC 33, Chapter 26 as a pilot program/demonstration project for "sustainable" alternative water source projects (USC 33§ 1300). Such advanced innovative alternative technology maximizes the benefit of the citizens in conformance with the allowed maximum grant issuances as provided for under USC §1282 (a) available for eligible treatment works or significant portion thereof utilizing best available innovative or alternative wastewater treatment processes and techniques referred to in USC §1281(g)(5). The RECLAMATOR is such best technology currently available.

AES shall provide the BADCT to serve the Los Osos Community under the requirements of USC 33§1281(h)(1,2,&3). The AES technology is the most cost effective alternative which has the most advanced processes and techniques meeting guidelines promulgated in USC 33§1314 (d)(3) which is the most cost effective alternative having the lowest life cycle cost of any other alternative by in excess of 15 per centum. The life cycle cost is calculated "post" grant qualification. For example, if a conventional sewer life cycle cost is \$250 million over a period of 20 years with little or no federal grant assistance and the RECLAMATOR qualifies for 75%, the per centum difference is 93 per centum. The program utilizing the RECLAMATOR is required by federal law, no options.



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1.1 AES "ADVANCED MBR" COMPARED TO "CONVENTIONAL MBR"

The "State of the Art" RECLAMATOR technology of AES is a "hybrid" of the current conventional MBR technologies in the wastewater industry such as offered by ZENON, Kubota, and others. These conventional membrane biological reactor (MBR) technologies, are no more than a conventional flow sewer plant (CFS) process or a sequential batch reactor (SBR) that has incorporated an "in-basin" or "out of basin" micro filtration or ultra filtration membrane in order to eliminate the use of a secondary clarifier. Each of these conventional MBR processes are only modified versions of the two (2) one hundred (100) year old technologies, the SBR and the CFS. These conventional MBR systems still have many disadvantages associated with these antiquated process technologies even though they have incorporated the membrane advantage. Even though they all produce the "membrane quality water", all of these conventional industry standard MBR technologies have increased the overall equipment, associated energy, and associated maintenance requirements and costs, and total overall complexity of these systems and have provided no fundamental or technological process advantages.

The "RECLAMATOR Technology" incorporates patented and patent pending advanced process techniques which sets it apart from all conventional MBR wastewater treatment technologies. The principal features and advantages of the "AES Technology" are the following:

Industry-Wide Application. The RECLAMATOR is the only advanced best available control process technology that can be provided pre-designed, pre-engineered and pre-manufactured in a package to accommodate any flow range from a single home of 250 gallons per day up to 2.5 million gallons per day. However, USC 33§1251 et. seq. requires that pollutants are eliminated at the point source of discharge which would be at the individual source of discharge of waste or pollutants, i.e. every sewer pipe coming out of each home or commercial establishment. The RECLAMATOR is the only and best available technology (BAT) currently available capable of achieving this goal.

No other MBR technology in the wastewater industry is BAT or full range.



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Inherent Flow Equalization. The AES Technology, due to its unique single basin complete mix nature, also can allow for hydraulic flow equalization which can be designed for up to 30% of the reactor volume. This unique feature eliminates the need for pre equalization or post equalization tanks to manage the diurnal hydraulic flow variations associated with most wastewater streams.

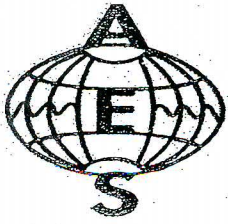
Conventional MBRs require some method of flow equalization. As they cannot operate in a complete mix single basin configuration, it is impossible to have inherent flow equalization, thus requiring additional tanks and associated operating equipment and maintenance.

The RECLAMATOR is designed with hydraulic flow retention of 48 hours.

Inherent Biological Denitrification. The AES Technology of the RECLAMATOR, exclusively, provides for the patented Influent Velocity Equalization (IVE) Collector and Omni Flow Partition which causes inherent denitrification to naturally occur within its complete mix bioreactor. The AES Technology denitrification capabilities were tested under a Technology Evaluation program which was conducted by the National Sanitation Foundation (now NSF International). The results demonstrated the AES Technology to produce an average Total Nitrogen (TN) of less than 4 mg/l; nitrates (NO₃) were 1.6 mg/l. Any level of TN less than 10 ppm is of a non pollutant level and as such is not considered to be a "discharge of waste". This unique denitrification process requires no mechanical equipment or extra tankage. Additionally, it doesn't take away from or add to the reactor volume.

Conventional MBRs (including all other systems) cannot accomplish denitrification without the use of mixers, other anoxic zones and/or tanks.

Submerged Spiral Wound UF Membrane. For membrane specified applications, the AES Technology utilizes a submerged spiral wound ultra filtration membrane technology, SpiraSep, which is manufactured by TriSep Corporation. The advantages of the SpiraSep are: back flushable, immersed, negative pressure, has high specific flux and simple manifold connection. Its evolutionary performance is due to the fact that it resolves fiber integrity issues



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common with hollow fiber membrane technologies. They are of a modular design and are easily interchangeable.

Conventional MBRs utilizing hollow fiber membrane do not have the integrity of the spiral wound SpiraSep membrane. Hollow fiber membranes have fiber breakage which allows disease causing pathogens to pass. The SpiraSep spiral wound membrane of the RECLAMATOR provides for a "definite barrier" for disease causing pathogens, disallowing them to pass with maximum integrity, even greater than chemical or UV disinfection methods.

The quality of the water produced by the AES Technology of the RECLAMATOR consistently meets a "0" pollutant, "0" discharge permeate water quality and meets the US Environmental Protection Agency's "Maximum Contaminant Level Goals" (MCLG) standard that is federally defined as a "non-enforceable public health goal". The RECLAMATOR standard of performance is; 100% removal of colloids and particulates larger than 10 nano meters, turbidity less than 0.1 NTU, over log 6 removal of bacteria (99.9999% removal), over log 4 removal of viruses (99.99% removal), removal of large molecular weight organic compounds (above 100,000 Daltons).

This consistent quality of reclaimed water produced by the "AES Technology", *"which reflects the greatest degree of effluent reduction"* which is *"a standard permitting no discharge of pollutants"*, which thereby establishes the "AES Technology" as **"The Best Practicable Control Technology Currently Available"** as defined and required by USC, Title 33, Chapter 26.

Foot Print. The foot print of the AES Technology is smaller to conventional MBR systems due to its inherent single basin hydraulic flow equalization and biological nutrient removal advantages.

The conventional MBR requirements for external hydraulic flow equalization and external anoxic denitrification chambers cause the conventional MBR to require more of a foot print than the AES Advanced MBR Technology.



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Energy Requirements. The AES Technology requires less energy as it requires no sludge return pumping facilities and equipment associated with the conventional MBRs.

Furthermore, the AES has recently developed and patented a hydro-electric turbine technology which utilizes energy created from capturing the turbulence caused by the aeration in conjunction with the spent aeration created within the reactor basin. These two forces turn the turbines which can in turn operate a generator. The turbines are expected to facilitate energy recovery of up to 80% of the electricity used to operate the AES Advanced MBR Technology system.

The “AES Technology”, provides for the most flexible, low-cost, dependable, appliance or device which consistently produces a “sustainable water supply”, permits no discharge of pollutants, while achieving several economic, environmental and resource objectives.

Currently, the “AES Technology” processes and systems are protected by six U.S. Patents, 5,186,821, 5,234,580, 5,316,671, 5,352,356, 5,374,353 5,384,049, and over 30 International Patents with three more U.S. Patents currently pending.

Respectfully Submitted,

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Tom Murphy
President, Inventor
Process Specialist



AES IDEA PROCESS ADVANTAGES

◆ DESIGNED SPECIFICALLY TO YOUR APPLICATION

AES's technical support service provides a complete treatment system design tailored to the specific project requirements. Influent compositions, for example, vary with each treatment situation, requiring a system designed to those concentrations. AES, therefore, does not sell pre-designed plants. **Each system is individually designed to minimize site construction and construction time.** Lift stations, headworks, and disinfection, as well as filters and other process equipment are also supplied to specification and shipped to the jobsite in modular configurations if possible.

The key to the individual design process is AES's proprietary design calculation worksheet. The Excel™ spreadsheet programs integrates industry standard engineering principles, applicable regulatory requirements, and specific project and site parameters with tank sizes and volumes to produce an overall process design.

◆ OPERATIONAL SIMPLICITY/SUPPORT

One of the primary concerns of nearly every small to medium scale wastewater treatment facility is effective operation of the plant. In fact, the Environmental Protection Agency estimates that up to 80% of small to medium sized wastewater treatment facilities are currently operating out of compliance.

AES recognizes this problem, and has addressed it in a number of important areas. First, AES recommends a telemetry based control center with each system installed to enable AES to provide ongoing monitoring and support. This computerized program gives AES staff the ability to monitor plant performance on a periodic basis, and flag data that may reveal an operational or process error. Second, AES concentrates its design efforts on minimizing the overall level of operator attention required. Making all equipment and maintenance readily accessible and easily removable to the surface is one example of this concentration. Third, AES expects to preempt operational problems through providing comprehensive on-site operator training and customized operations and maintenance manuals for each facility. Fourth, AES stresses the development of rapport with each facility operator, such that they feel comfortable asking any question. AES is committed to establishing working relationships with each operator, under the assumption that good operator



rapport translates into excellent plant performance. Finally, AES has proven their commitment to operations support in that they contract operate a number of their own facilities. AES also owns two utility districts which utilize AES facilities for the on site wastewater treatment demands.

◆ MINIMIZATION OF SLUDGE HANDLING

Sludge management is often identified as one of the most persistent problems in small, mechanical plants. The key to minimizing sludge is the system design's ability of converting the particulate portion to a soluble form. When the biomass consume organic material in a soluble form, there will be a substantial reduction of biosolids and waste sludge. The typical sludge production of the IDEA Process is less than .15 lb per pound of BOD loading per day. This is largely due to the high population of MLSS that can be maintained in the IDEA Process plants (typically 6,000-8,000 MLSS). The greater population causes a more complete and more efficient utilization of the organic material by the organisms. AES designs achieve this by enhancing the solubilization of colloidal and particulate organic matter. The IDEA Process is designed around a 70 day sludge age parameter to retain particulate matter in an environment that is substrate limited long enough to solubilize it into low molecular weight soluble compounds. As a result, solubilization occurs as extra cellular enzymes are excreted into the aqueous liquid, hydrolyzing the colloidal and particulate organic material. Once this solubilization occurs, the biomass converts it to carbon dioxide and water, resulting in more efficient consumption of biosolids.

As an appurtenance, AES has many options to select from to provide the best solution for any specific project. The type of method selected will take in to consideration the size of the plant, economic considerations, plant loading, the local disposal options available, operator qualifications, etc.



◆ PLANT EXPANDABILITY/ PHASING

A key in providing cost effective treatment designs is the ability to provide flexibility. Each AES facility can be expanded to accommodate additional hydraulic flow, or modified influent concentrations simply by bringing additional reactors on line to maintain the appropriate treatment levels and detention times. Plants can also be upgraded to include such process designs as disinfection and denitrification by adding reactors to the original treatment design. AES plants do not typically require concrete footings or tie-downs and are buried in pea-gravel. This makes expansions or upgrades inexpensive in terms of excavation, and simple in terms of accessibility.

A common application utilizing the flexibility of the AES design is the staging of plant size to coincide with development. Often, projects such as subdivisions are developed over a period of time, or in phases. AES plants are easily modified to reflect actual demand. This saves the owner a large portion of initial cost while affording him (and the regulatory agency) the opportunity to view the performance of the treatment process over time before committing to the full scale plant (See Sample Drawings, Section 3).

◆ SUPERIOR COLD WEATHER PERFORMANCE

Systems utilizing multiple tanks and separate clarifiers have great difficulty maintaining wastewater temperature as it flows from tank to tank and back and forth through sludge return lines, etc. Biological reactions are approximately twice as fast at 80° F than at 35° F. Clarifiers, in particular, are more effective when the mixed liquor is warm. At 80° F, the rate of particle settling is 50% greater than the rate at 50° F. Efficiency and reliability, therefore, can be seriously effected if fluctuations in ambient temperatures are allowed to effect the temperature in the treatment process. Heating and insulating equipment can be added to other treatment process designs, but at a high level of additional expense. Wastewater temperatures are very efficiently maintained within the single basin process technology of the IDEA systems.

◆ GUARANTEED PERFORMANCE

AES plants carry a Three (3) Year Performance Warranty. If the plant fails to perform in accordance with the specified design and operations requirements, AES, at their expense, will modify the plant to bring it into compliance or show



the reason for noncompliance is not due to the design or operations under their direct control.

◆ RECOVERABILITY/ FACILITY BUYBACK PROGRAM

Development often occurs in high growth regions with existing wastewater treatment plants which are either too small to accommodate growth or require extensions of main lines. Developers usually do not have the time or money to wait for the local utilities to expand service. AES plants fit perfectly in these situations as interim facilities because they can be recovered, modified, and resold. Because AES plants utilize non-corrosive components, they retain their value over time. AES often provides buyback provisions as a part of the initial contract. Below is a typical buyback schedule and terms.

TERMS OF BUYBACK:

AES Corporation agrees to repurchase the plant from the customer under the following provisions: 1) The owner shall be responsible for the disconnect, removal, and shipping preparation for the equipment and tanks. 2) The plant must be operated in full compliance with AES's operation and maintenance manuals, in order to be eligible for repurchase. 3) Any damage to the equipment, controls, or tanks, beyond that which is considered normal wear and tear will be deducted from the repurchase price. 4) The repurchase percentages are based upon the length of time in operation, to be measured from the first day of start up, to the date of disconnect.

<u>Term:</u>	<u>% of purchase price (minus taxes & freight):</u>
<i>Less than one year in operation</i>	<i>45%</i>
<i>Less than two years</i>	<i>38%</i>
<i>Less than three years</i>	<i>31%</i>
<i>Less than four years</i>	<i>24%</i>
<i>Less than five years</i>	<i>17%</i>
<i>More than five years</i>	<i>No Buyback Provision</i>



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residents of Los Osos, as the consumer of their water and as an AES Discharge Elimination Service Company customer, have 100% consumptive rights to said repurified water of the **Reclamator™**. It is however important for the Water Board and the County to understand that all repurified water which would be utilized by anyone other than the original consumer, i.e. taken from the property of the consumer via a required hookup to a conventional community sewer collection system, would be done so at a cost to that recipient. That cost is calculated via the **Reclamator™** water meter and charged at a rate relevant to the rate charged by that public drinking water purveyor serving the AES customer.

Be aware that, with or without a publicly owned conventional community sewer collection system available, all citizens have the 100% consumptive right to use of their water they have purchased the right to use. The **Reclamator™** is the new onsite water purification device or household appliance which now makes that option available to the general public. Furthermore, unlike a garbage service, there is no law which denies a citizen of their right to eliminate the waste from their own water or require them to give a public sewer provider a "range flow" if the option for purification of their water back to a resource of value is available. The **Reclamator™** makes this now possible. For this reason, the **"Formal Notification of Exemption from Assessment(s) and Enforcement"** is valid and will serve to notify all public authorities of the fact that they have no legal authority beyond their ability to control the discharge of pollutants provided a citizen opts not to himself. Therefore, the Citizens of Los Osos who want a conventional community sewer collection system should have one with the understanding that they will be the only ones who will pay for it as all AES customers will have no need for it as they have opted to exercise their right, as an "owner and or operator" of the source, to eliminate their discharge of pollutants and reclaim their water for their own future beneficial reuse applications. Furthermore, the public sewer service provider won't be able to neither charge AES customers for hookups or sewer services as it would bankrupt the public sewer service provider to pay for the repurified water required hookup is mandated. Obviously, a required hookup, now that the **Reclamator™** become available, will not be an economically feasible option for that service provider.

THE NEW PARADIGM – WATER CONSERVATION AT THE SOURCE – IT'S THE LAW

Federal Law, U.S. Code 33§1254 (o), calls for "methods of reducing total flow of sewage and unnecessary water consumption in order to reduce requirements for, and the costs of sewage and waste treatment services...and methods capable of achieving the maximum reduction of unnecessary water consumption." The Discharge Elimination Service utilizing the Reclamator is the ultimate method having a system which provides for MAXIMUM of 1) total reduction of sewage, 2) unnecessary water consumption by providing for purification of 100% of all household water used per day, elimination the "wasting" of water, and 3) reduces the costs of sewage and waste treatment services by 70% – 95%, depending on total grant assistance provided.

Federal Law, U.S. Code 33§1281 (g)(2)(B), requires the regulatory authorities "to allow to the extent practicable (possible) the application of technology which at a later date will



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ide for the reclaiming and recycling of water or otherwise eliminate the discharge of
tants." The Discharge Elimination Service utilizing the Reclamator is the ultimate
nology that will immediately "eliminate the discharge of pollutants" and produces
rified water which, at any date in the future, the consumer, our Discharge Elimination
ice customer will be able to utilize for their own beneficial reuse applications, i.e. toilet
ing (which conserves approximately 50% (125 gallons/day) of a household water usage
lay, landscape irrigation, etc., thereby providing for 100% reclaiming and recycling of
water.

0,000 gallons per day or 474,500,000 per year or 1,400 acre-feet per year of "new
r" as an "alternative water source" will be provided to the Community of Los Osos as a
t of the AES Discharge Elimination Service.

ference to your "Central Coast Water Quality Control Plan (Basin Plan), it is required to
tain alternatives", under the area-wide waste management plan requirements, which
nate the discharge of pollutants as is required per U.S. Code 33§1288. You should know
the "residents of Los Osos considering" the AES Discharge Elimination Service is in
oliance of the Federal Law of the United States, Title 33, Chapter 26 and you Mr. Briggs
d be in violation of such law if you didn't act to "assist and to require" such alternative
ion provided it were available and economically feasible, which it is.

re already addressed the "required hook-up" scare tactic, or should I say "threat", you
to use isn't going to work as you California Water Code 33§13050 clearly defines our
r produced by the **Reclamator™** as a resource of value. As I earlier stated, I have no
em having the public conventional sewer collection system provider being my "water
omer".

your departments responsibility to notify the County of San Luis Obispo of their obligation
mediately, in the best interest of the public, the water, and the environment to embrace,
ulgate and implement the demonstrated technology of the **Reclamator™** now that the
r Board has been made aware of it being available. **Any further delay in doing so
ld be breach of your fiduciary duty.**

rely,

Thomas Murphy,
dent and CEO
nced Environmental Systems, Inc.



ABOUT THE TECHNOLOGY

I. PROCESS DESCRIPTION AND HISTORY

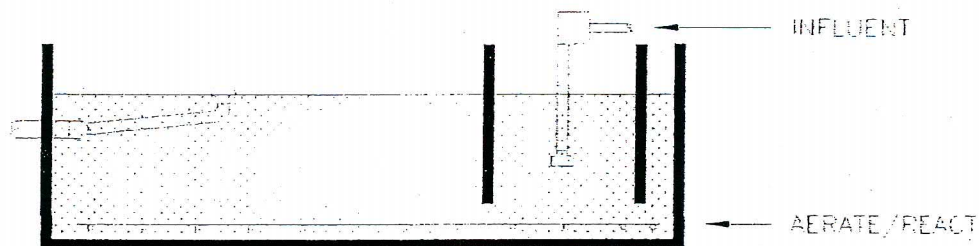
Intermittent Decant Extended Aeration

IDEA is an acronym for Intermittent Decant Extended Aeration. The IDEA process of treating wastewater combines and enhances the proven biological processes of Complete Mix Extended Aeration and Sequential Batch Reactors (SBR's).

Raw screened sewage is introduced through patented apparatus directly into the reactor basin where all biological treatment and solids removal takes place. Neither flow equalization or multiple basins are required. The reactor basin typically goes through six four hour cycles per day, with each cycle consisting of three phases, aeration, settle, and decant. This cycle may be changed in order to facilitate high levels of nitrogen and phosphorus removal.

Standard Four Hour Cycle

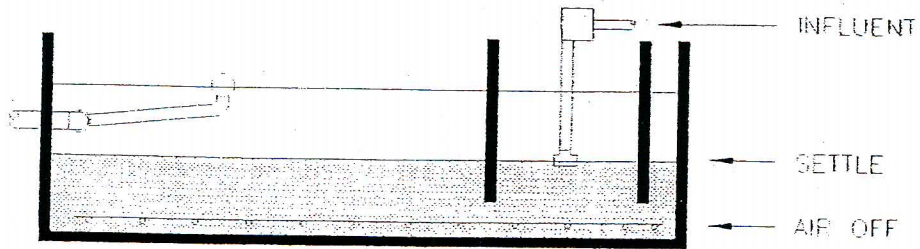
1. First Phase: Aerate and React - Two Hours



Receives Influent
BOD₅ Oxidation

Mixing
Nitrification

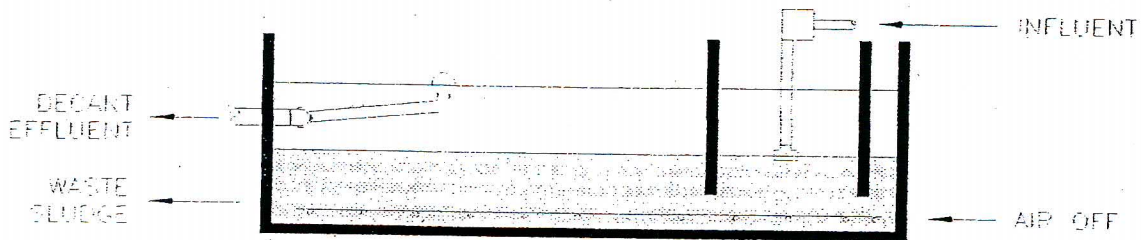
2. Second Phase: Settle Phase - One Hour



Receives Influent
Continued BOD₅ Oxidation

Biomass Settles
Denitrification

3. Third Phase: Decant Phase - One Hour



Receives Influent
Continued BOD₅ Oxidation
Sludge is Wasted

Decants Effluent
Denitrification

A Brief History of the IDEA Process Development

The processes from which the IDEA system has been derived took their most rudimentary form with the work of Andern and Lockett in the early 20th century. They incorporated the fill and draw concept in their experiments with biological treatment of wastewater. Although successful as a treatment process, it never developed into an applicable process as cost and time effective equipment was not available to support the process.

The Activated Sludge process (a separate tank for each process) was to be the overwhelming choice until fill and draw systems re-emerged in the form of Sequential Batch Reactors (SBR's). Only within the last twenty years has



technology been applied to the fill and draw system in a way that has resulted in a superior and more cost efficient treatment system.

The final step in the refinement of the SBR process was addressed in developments by Arthur Brown and Stephen Jones during the late 1970's in Australia, and perfected with the development of the IDEA process. These following Advanced Environmental Systems IDEA process enhancements address the major drawbacks of SBR's now in today's marketplace.

- Patented influent control apparatus that allows the system to receive influent on a continuous basis, eliminating the mechanical equipment required to divert influent for multiple basin configurations.
- Apparatus designed to deliver raw sewage (carbon source) directly to the sludge blanket, facilitating denitrification without the use of costly mechanical mixers.
- A patented decanter design that is non-mechanical in nature, eliminating frequent overflow and effluent violations due to mechanical failure.



II. TECHNICAL OVERVIEW



Primary Treatment

As with any treatment process, the IDEA system works best when inorganic solids are removed from the wastewater stream prior to the reactor. Most smaller IDEA systems will utilize either a preloader or a barscreen. A preloader is a separate tank similar to a septic tank that removes both settleable and floatable solids. Preloaders must be pumped occasionally. As an option to the pre-loader, a cone shaped barscreen may be located within the IVE Collector, and should be cleaned every few days.

The larger systems (Grand IDEA and *ENVIROPro*) will use an automatic screening device.

Influent Velocity Equalization (IVE) Collector

The patented IVE Collector completely diffuses hydraulic influent flow velocities and turbulence created by splash energy. Furthermore, the IVE Collector diverts downward hydraulic velocities created by influent flows, thereby preventing upset of the biomass in the Omni-Flow Partition during the settle and decant phases of the operation cycle.

Omni-Flow Partition

The patented Omni-Flow Partition (Pre-React Zone) has a cylindrical or rectangular shape, and is elevated from the bottom of the basin. This allows up to a 360 degree opening between the bottom skirt of the Omni-Flow Partition and the basin floor. These design features (shape and elevation) create a very low hydraulic flow (gpm) to hydraulic port area (square feet) ratio, typically less than 3:1. A low transfer rate between the Pre-React Zone and Reactor Basin allows influent to flow through the biomass, preventing wash out and short circuiting during the settle and decant phases of the process.

The Pre-React-Zone created inside the unique Omni-Flow Partition, with its high F:M Ratio, overcomes problems of transient peak flows of both hydraulic and organic loadings. Initial BOD₅ absorption into the biomass of 70% to 80% is achieved. Due to the high F:M Ratio, growth of filamentous organisms is discouraged, thereby mitigating sludge bulking conditions. An environment is provided where more desirable rapid-settling zoogeleal facultative organisms proliferate. The end result is a superior sludge which settles rapidly.

Aeration System

AES IDEA systems generally use one of four aeration systems, depending on the basin configuration, and strength and volume of wastewater. The four types are built around fixed coarse bubble diffusers, fixed fine bubble diffusers, floating train fine bubble diffusers, and high speed floating aerators. In almost all cases, diffusers are accessible for cleaning without draining the reactor basin. For the first three options, either positive displacement or centrifugal blowers may be used, depending on basin depth, air volume, and customer preference.

Fixed coarse bubble diffuser systems are generally used for low strength, mixing intensive applications. Additionally, projects using deep tankage may be able to use coarse bubble diffusers due to the resulting increased oxygen transfer efficiency.

The most common form of aeration systems use fixed fine bubble diffusers. Today's flexible sheath non-clog fine bubble diffusers result in excellent oxygen transfer efficiency even at shallow depths, while still delivering enough air for mixing purposes.

For large lagoon-based operations (*ENVIROPro*), AES patented Floating Disk Aeration Chains are generally used. The floating aeration chain uses a flexible air header that extends from one side of the basin to the other. At intervals along the header are disc shaped floats, through which air lines drop to fine bubble diffuser assemblies. Air bubbles rising from the diffusers force the disc shaped float to move in a random pattern around a controlled area of the basin. By installing several such aeration



chains throughout the basin, the entire basin can be mixed thoroughly while using only the amount of air needed for biological treatment.

Finally, High-Speed Floating Aerators can be used in conjunction with mechanical mixers for *ENVIROPro* applications in warmer climates.

Reactor Basin and Decanter

The IDEA Reactor Basin develops an MLSS population that may range in concentration from 1,000 mg/l to over 10,000 mg/l. It is an unsteady-state acclimated population that adapts to alternating anoxic and aerobic conditions which consistently and repeatedly range in DO (dissolved oxygen) concentration from 0 mg/l to 3 mg/l. Consequently, shock organic loads have little effect on the process. As a result, the system achieves nitrogen and/or phosphorus removal and maximizes aeration efficiency.

The patented AES IDEA Floating Decanter may be installed in both pumped effluent and gravity flow effluent configurations. The gravity flow effluent decanter utilizes a ballast tank that can be filled with air or water depending on whether the system is to be decanting. The pumped effluent decanter requires only a simple effluent pump, while the gravity effluent pump requires only a simple air pump. Both systems are extremely reliable and maintenance free.

The unique nature of the AES IDEA decanters in combination with the IVE Collector and Omni-Flow Partition allow the IDEA system to be installed in virtually any basin configuration.

Sludge Storage

Because the IDEA process operates at extended sludge ages, significantly less sludge is produced compared to conventional systems. This low sludge production, combined with the ability to operate at high MLSS values, results in the ability to actually store sludge within the reactor basin, eliminating the need for a sludge holding tank. However, the sludge produced will have a lower solids content. Therefore, AES recommends either an aerated sludge holding tank or gravity thickener be installed on larger systems.

Disinfection

Any standard disinfection process may be used in conjunction with the IDEA process. Typical processes are tablet, liquid, or gas chlorination, and ultraviolet radiation.

III. PROCESS CONTROL

System Options

The AES IDEA systems are flexible enough to be designed with a Programmable Logic Controller (PLC), solid state, or Supervisory Control And Data Acquisition (SCADA) based control system. In all cases, the same high quality effluent standards and reliability are maintained.

Solid State Control System Advantages

- most cost effective system
- occupies the least amount of space
- most economically serviceable
- operating personnel may be more familiar with solid state based control systems

PLC System Advantages

- can be programmed to automatically adjust process cycles to feedback from ancillary equipment such as flow meters, pH probes, and remote pump stations
- facilitates the feedback and accumulation of operating data
- facilitates monitoring of all equipment in the plant
- the process can be easily adjusted
- will ease the transition to a SCADA system at a later date

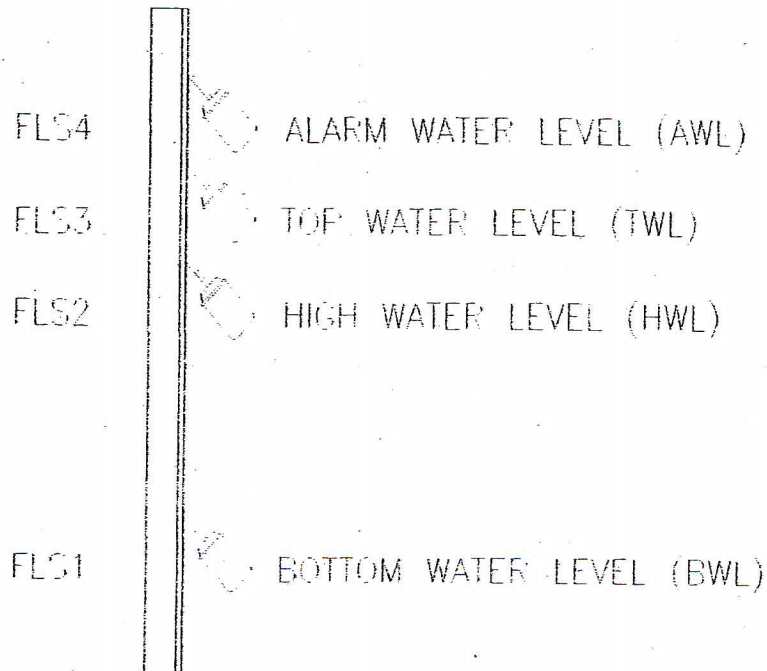
SCADA Advantages

- all advantages of the PLC system
- allows continuous, real-time, monitoring of all equipment operation and processes
- allows continuous, real-time, monitoring of remote locations such as pump stations
- allows operators to monitor and review past feedback from when the plant was unattended
- allows access to the above information from remote terminals (including laptops)



Control Logic: Four Hour Cycle

The AES IDEA process normally operates on a three phase cycle, repeated every four hours. The cycle may occasionally be changed to facilitate the treatment of higher strength wastewater.



- aeration phase length = 2 hours
- settle phase length = 1 hour
- decant phase length = 1 hour
- feed = continuous

The aeration phase typically is set at 2 hours in length. The reactor basin will continue to aerate for the full two hours as long as the level remains within the bottom water level (FLS1) and the high water level (FLS2). If the water level in the basin should rise and trip FLS2, the air will be shut off for the remainder of the 2 hour aeration phase. This is done to allow the basin to settle should the system need to decant early. Should the peak flow continue, after a volume of equivalent to 10% of the design flow is received, the top water level (FLS3) will trip initiating early partial decants only until FLS3 returns to its normal position or until the scheduled decant takes over via the timer and returns the level back to the bottom water level (FLS1) and normal operation resumes.



The settle phase is typically set at 1 hour in length. No aeration will take place during the settle cycle.

The decant phase follows the settle phase. The decant phase is typically set at 1 hour in length. No aeration will take place during the decant phase. The decanter will run until the basin water level reaches FLS1 or until 1 hour has passed, whichever occurs first.

The system is equipped with an alarm water level float (FLS4) that will indicate either extremely high flow conditions or equipment failure. The alarms will be both audio and visual.

In some cases, control of the sludge wasting pump will be automatic. This may be required in large systems or by systems requiring high levels of nutrient removal (nitrogen and phosphorus). In such cases, wasting will occur every cycle at the end of the decant phase.

IV. BIOLOGICAL PROCESSES

Biochemical Oxygen Demand (BOD) Removal

In the IDEA process, as with all aerobic treatment processes, unwanted organic pollutants in wastewater are consumed by aerobic (requiring oxygen) microorganisms. The most widely used indicator of the relative strength of organic wastewater is Five Day Biochemical Oxygen Demand (BOD₅). BOD₅ is defined as the amount of dissolved oxygen the aerobic microorganisms require to biologically oxidize the organic matter.

During the Aeration Phase of the IDEA process, naturally occurring microorganisms grow and reproduce by consuming organic pollutants and oxygen. The by-products of this process are carbon dioxide, water, and the continued life cycle of the microorganisms. The process may be summarized in the following equation:

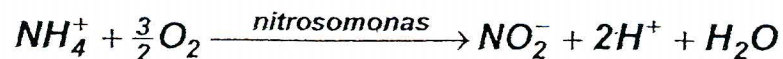


In general, 1.5 pounds of oxygen are required for every pound of BOD₅ to be removed.

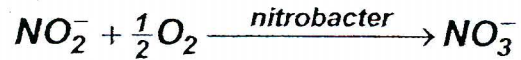
Nitrification

Nitrogen exists in wastewater in two principal forms, organic nitrogen and ammonia nitrogen. Ammonia exerts high levels of oxygen demand that are harmful if discharged to the environment. This problem can be eliminated by converting the ammonia and organic nitrogen to nitrate.

In the IDEA process, ammonia and organic nitrogen are converted to nitrate by a two-step process facilitated by naturally occurring aerobic microorganisms. In the first step, *nitrosomonas* bacteria convert ammonia (NH₄) and oxygen to nitrite (NO₂), water, and hydrogen ions:



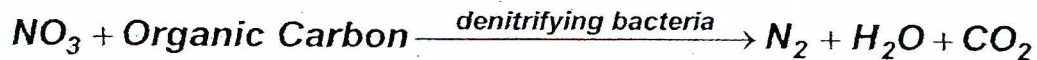
In the second step, nitrobacter bacteria convert nitrite and oxygen to nitrate (NO₃):



For these reactions to occur, 4.57 pounds of oxygen are required for every 1 pound of ammonia to be removed. Additionally, it should be noted that 7.1 pounds of alkalinity (as CaCO₃) will be required per pound of ammonia.

Denitrification

High levels of nitrate are also polluting in many areas, thus necessitating their removal also. In the IDEA process, naturally occurring bacteria use organic carbon (incoming sewage) to convert nitrate to nitrogen gas, water, and carbon dioxide. This process occurs in an anoxic (very low dissolved oxygen) environment where the denitrifying bacteria get the oxygen they require from the nitrate molecule, causing the nitrogen to dissipate as nitrogen gas. The following equation illustrates the process:



Phosphorus Removal

Phosphorus is a nutrient for algae growth that often must be removed. Under the ideal conditions created by the IDEA process, phosphorus removal is accomplished by biological means. The microorganisms in the mixed liquor are able to remove an amount of phosphorus from the wastewater over and above the amount that is required for growth. This is termed "luxury uptake."

List of Exhibits

Exhibit 1: Executive Summary, Advanced Environmental Systems, Inc.

Exhibit 2: The “Reclamator Innovative Alternative”

Exhibit 3: AES IDEA PROCESS ADVANTAGES

Exhibit 4: About the Technology