Refinery Water Engineering & Associates, Inc.

Refinery Wastewater Associates

Refinery Wastewater Operations

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About Refinery Water Engineering & Associates, Inc.

Refinery Water Engineering & Associates, Inc. (**RWE**) is a California corporation founded by Mr. David Kujawski. **RWE** has been in business since 2009 and is a debt free company. Its corporate office is located in El Segundo, CA. and its central field office is headquartered in Nederland, Texas, near Port Arthur, Beaumont, and Houston. **RWE** also has 2 wholly owned subsidiaries, Refinery Wastewater Associates (**RWA**) and Refinery Wastewater Operations (**RWO**). In addition, **RWE** is engaged in a number of strategic alliances with other specialized firms and major universities, such that **RWE** can provide turnkey environmental solutions for its clients.

RWE as its name implies is most focused on the Oil Refining market. Additionally, the related Petrochemical industry is a rapidly growing market segment in which **RWE** has performed well. **RWE** also has considerable experience in Oil & Gas Production areas, as well as in the Pulp & Paper, Mining, and Utility industries. **RWE** provides comprehensive environmental consulting services for its clients, and prides itself on its ability to effect global water management within operating plants. **RWE** effectively delivers an integrated program involving engineering, operations, and maintenance. **RWE** has expertise in wastewater, supply water, cooling water, boiler water, and process water. **RWE** also works on sludge disposal, hazardous materials handling, air quality compliance, hydraulic fracturing water reuse, as well as regulatory and permitting processes.

RWE is all about its people, and it is this asset which has made the difference, not only in its growth, but also in its competitive stature. **RWE** has 19 technical experts who cover the entire spectrum of science and engineering disciplines applicable to environmental consulting. Seven members of this team are world renowned experts in their field. Ten members of this team have spent decades as professors at major universities. Cumulatively the **RWE** staff has provided engineering services in over 800+ industrial wastewater projects for more than 30 years. **RWE** has completed environmental projects in more than 40 U.S. refineries and 13 international refineries, which includes assessment audits, engineering, operations, software modeling, chemical application, equipment design, and laboratory services.

RWE has the capabilities to perform major tasks within Design-Build-Operate (DBO) projects. **RWE** by itself can handle a project from inception through all stages of preliminary engineering, including preparation of P&IDs and Bills of Materials. Through several key strategic alliances, **RWE** partners with several large engineering firms to provide detailed engineering and construction. **RWE** from start to finish handles project management on such alliances, and leads system start-ups, commissioning, and operator training, and troubleshooting. In conjunction with its strategic partners, **RWE** can also deliver Design-Build-Own-Operate-Maintain (DBOOM) project scope variations. **RWE** is the only firm in the U.S. which has an oil refinery specific wastewater treatment training program which is certified and earns major university credits.

RWE also has secured long term relationships with several major universities via open ended grants, and works jointly with these institutions on many projects. The **RWE** relationship with Texas State University Lamar enables a cooperative offering where the university's state of the art environmental lab is able to be deployed on **RWE** projects.

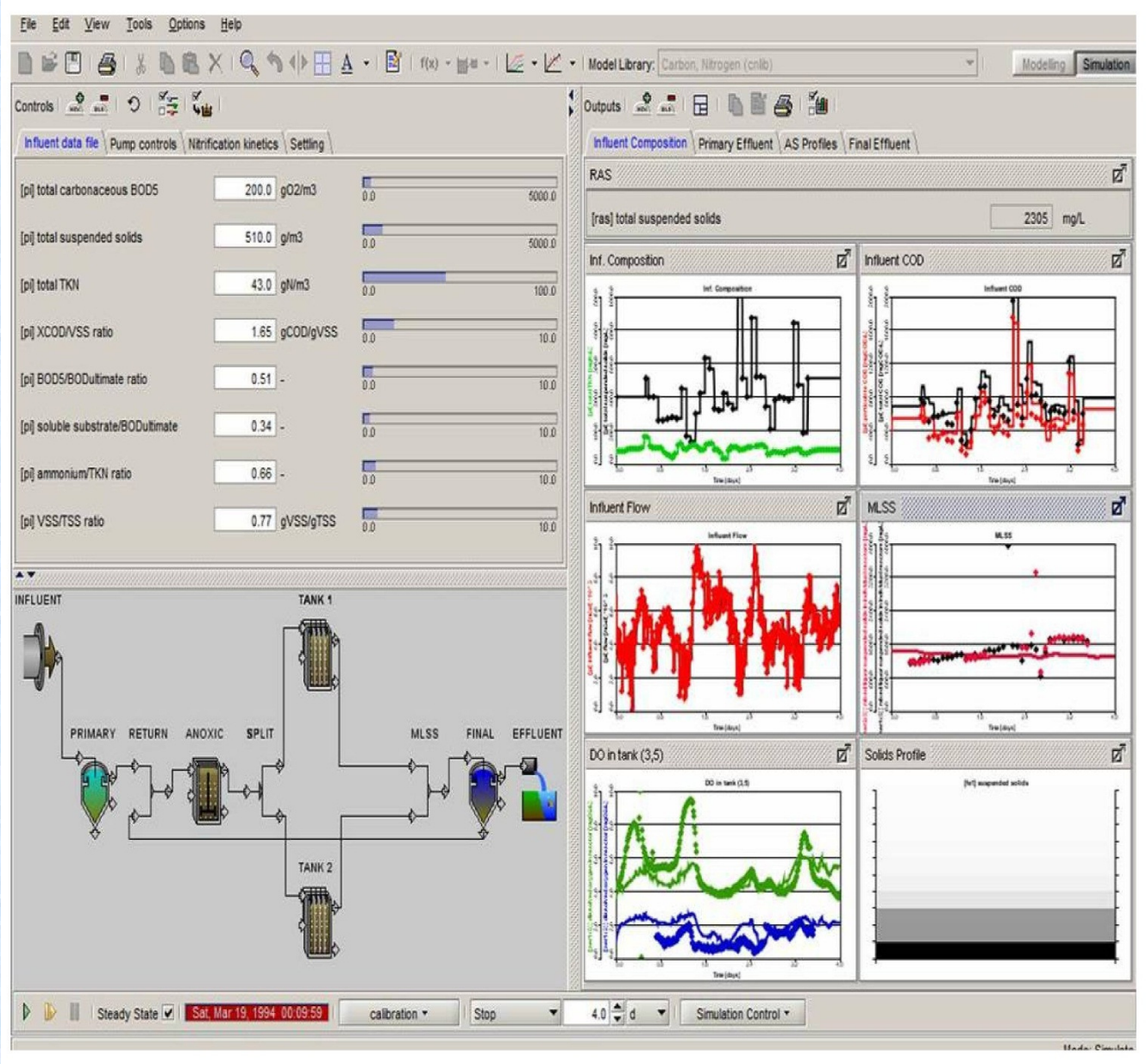
Think Tank Solutions

Because of **RWE**'s vastly experienced staff, a unique business model has been able to be executed with great success. Perhaps the best description of what **RWE** does could be stated that RWE is an "Environmental Solutions Think Tank" focused on problems common among a select group of operating plants. **RWE** approaches these solutions on a case by case, site specific basis by deploying the newest cutting edge technologies coupled with decades of hands on experience. What is often acknowledged as the most difficult environmental process area, Biological Wastewater Treatment, is **RWE**'s strongest application area. Many of **RWE**'s team members literally wrote the books. **RWE**'s unique "think tank" approach is perhaps best validated by the fact that during its entire history, **RWE** has never bid on any of its procured projects. All **RWE** projects to date have been awarded on a sole source basis. And perhaps **RWE**'s most satisfying client feedback supports its commitment to the concept of "Operations Based Engineering", that is, the concept that every **RWE** project must have a measurable plant operational improvement attainable at the end. In other words, project designs which culminate in "studies leading to more studies" are carefully screened out in the early evaluation phases.

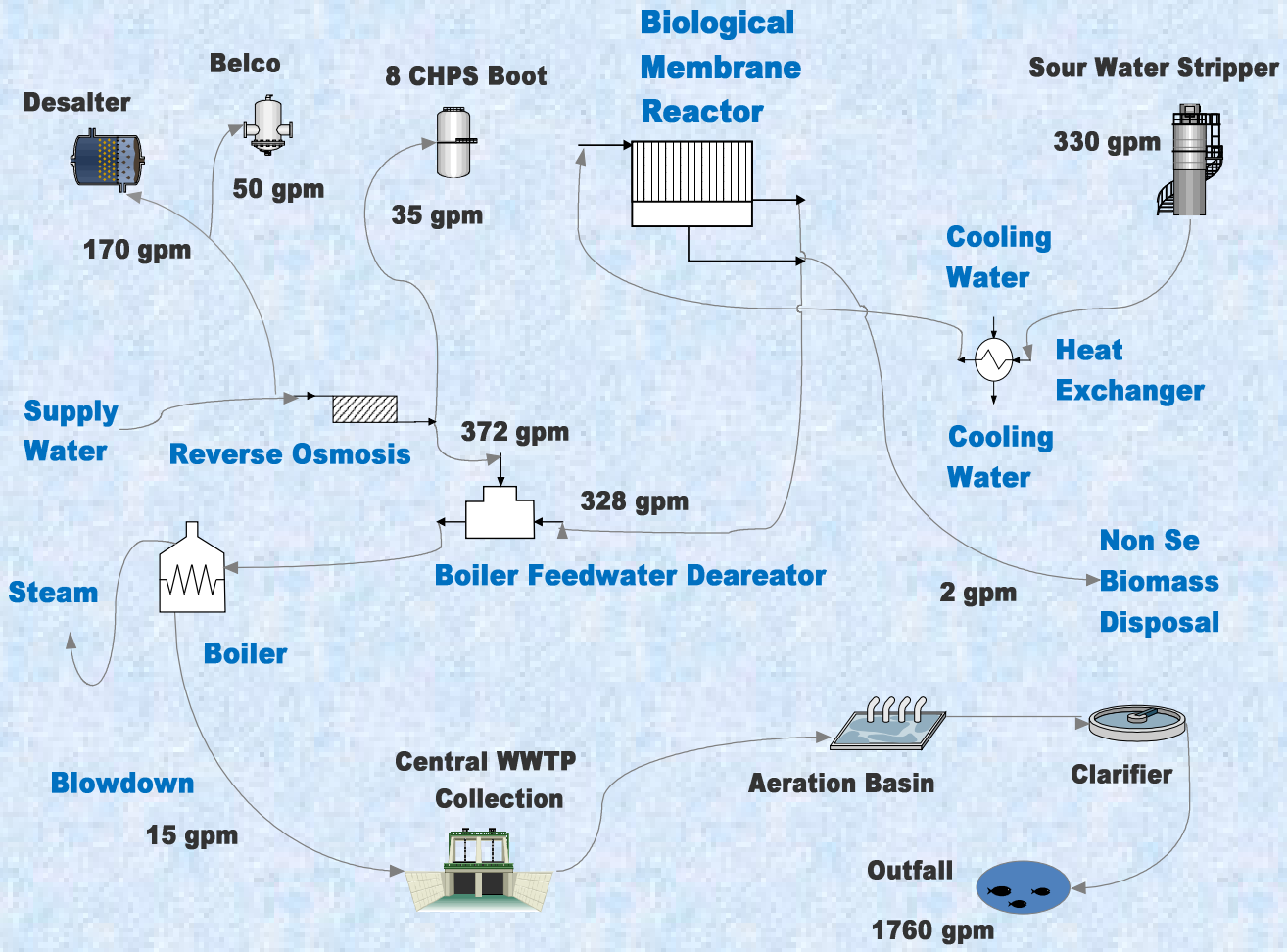
Categorically, **RWE** focuses its project work in these areas:

- Optimization of wastewater process control variables and target ranges, such that improved permit compliance, increased equipment capacities, or reduced operating costs can be realized.
- Quantitative predictive modeling for water and air systems, such that efficient plant trouble shooting and precise mathematical process control can be realized, especially for such purposes as Upset Recovery.
- Process simulation design, modeling, treatability, characterization, and pilot plant research and operations, intended for scale up culminating in improved process control in full scale plants.
- Design of onsite Biological Selective Adaptation Reactors (Chemostatic Reactors) for increased biological wastewater contaminant removal capacities, increased ranges of contaminant molecules, or increased rates of contaminant removal.
- Fate & Transport and Material Balance investigations with oil refining specific software in order to optimize water and waste handling from a Source Control perspective.
- Isolated capture, treatment, and reuse of select wastewater streams, coupled with the precise requirements for given supply water needs, resulting in an efficient and integrated global water management program.
- Hazardous listed sludge detoxification treatment and disposal to non-hazardous listed alternatives, utilizing creative exception / exemption permitting strategies.
- Low cost treatment alternatives to Benzene-Neshaps, VOCs, and other hazardous air emission regulations.
- Delivery and deployment of new technologies currently limited under Technology Licensing Agreements, such that clients can utilize the newest breakthrough solutions.
- Brokerage of Hydraulic Fracturing (Frack) water, both for supply and disposal, which engages creative new alternatives that are carefully engineered such that supply specifications are precisely matched or adjusted with disposal requirements.
- Expert Witness investigations and testimony for environmental litigation.

RWE is strategically aligned with a number of companies to broaden its base of solutions even further. For example, **RWE** with its partner Hydromantis Software Solutions, Inc., recently completed and produced the first ever Refinery Wastewater Biokinetic Simulation Model, which accurately predicted the full scale plant's Activated Sludge treatment system performance. This biological treatment process contained more process variables than any other process in the entire refinery, by far. The illustration below is an example of the computer interface which was developed in this project to predict process performance over a wide range of variations. In the illustration, the operator can change almost any influent variable in real time, and can instantaneously track virtually any resulting changes, under either steady or unsteady state conditions. This model actually predicted consistently within 6% of the actual historic plant measured contaminant levels of interest. RWE determined the critical site specific, full scale plant Biokinetic Constants and managed process control in this project. Hydromantis designed and populated the software platform.



RWE, with another group of project partners, spearheaded design on the first operating Refinery Sour Wastewater Reuse system, where stripped sour water is isolated upstream of the central wastewater collection system, then locally treated to steam condensate quality, and finally returned for reuse directly to the Boiler Feedwater Deaerator, bypassing the standard supply water pretreatment Reverse Osmosis (RO) system. This saves a medium size refinery more than one million dollars a year combined from reduced central wastewater plant loading and from reduced RO loading. The project provided a return on investment of 1.7 years. This project work earned RWE publication in prestigious *Hydrocarbon Processing Magazine*.



Environmental Sustainability

Process Engineering

The **RWE** Team experts have over three decades of experience providing environmental consulting and engineering services worldwide. This team deploys its abundant set of Data Acquisition Tools.

1. To continually evaluate a client's database and couples it with both physical and statistical modeling for ongoing process control optimization.
2. To continually update operations training based on the latest optimization findings for ongoing process control enhancement.
3. To deliver the best ongoing process controls recommendations in real time and in timely fashion such that Operations can actually make use of them, especially when plagued with delicate upset excursions.

The Reliability realized from this approach defines **RWE** Sustainability.

Simulation Modeling

Refineries and Petrochemical plants usually operate their wastewater treatment systems in unsteady state more often than steady state, and frequently in an upset condition mode. Historically these plants have only been able to maintain their processes via a trial and error, after the fact, methodology. **RWE**'s Simulation Modeling techniques allows the client to transcend this methodology to a precise, mathematical solution approach. Furthermore, with these tools in hand, the high cost of environmental compliance can be effectively managed, via pinpoint identification of opportunities for savings. With these tools, it is common in a moderate to large size refinery to be able to capture one to two million dollars per year in savings just from improved efficiency and consistency in the process control of aeration and sludge generation systems. In recent years these tools have transcended from quality assurance applications to cost control applications, where the ability to capture ~50% reductions in Sludge Disposal and in Aeration Energy can be consistently targeted.

The Standardization realized from this approach defines **RWE** Sustainability.

Wastewater Operations & Engineering Training

Almost all standard issue training material available anywhere on the subject of wastewater treatment plant operation is based on information which originated from municipal sewage plants. **RWE** has conclusively demonstrated that refinery and petrochemical wastewater is markedly different from that of municipal sewage, and even varies significantly from refinery to refinery. **RWE**'s widely published work in 2010 defined the vast differences between Biokinetic Constants in refineries vs. the published literature. Furthermore, most of this published literature has not been updated in decades. These facts are responsible for the poor performance of wastewater treatment systems in refinery and petrochemical plants, both from equipment design and process control standpoints. **RWE**'s Unique Refinery Specific Wastewater Treatment Operations Training Course is certified earning major university credits, and is the only available course of this nature. It is taught by committee by Team **RWE**. Every client team member learns the best way to run their specific facility.

The Continuity realized from this approach defines **RWE** Sustainability.

Selective Adaptation of Biological Wastewater Systems

In some cases, optimized process control of wastewater treatment may not be enough to meet the goals of the client. With increasing wastewater contaminant loading resulting from the current trend of using cheaper crude types in refining, existing plant system design capacities can be exceeded quickly. Furthermore, downstream changes in chemistry can result from this, thus producing recalcitrant or inhibitory molecules which may not biodegrade efficiently within the existing system design. Rather than engaging in a major capital project expansion to remedy such cases, a much cheaper solution can often be deployed with the use of a simple sidestream Chemostatic Reactor Tank to change the Biokinetic Constants of the indigenous microorganisms within the existing biological wastewater treatment system, via Selective Adaptation Technology. This technology has opened up such creative solutions in certain systems where upstream of the Bioreactors; the Dissolved Air Flotation (DAF) pretreatment can be partially bypassed. This captures substantial cost reductions for the refinery, where DAF hazardous sludge is exchanged for non-hazardous Bio sludge.

The Longevity realized from this approach defines **RWE** Sustainability.

Refinery Wastewater Reuse

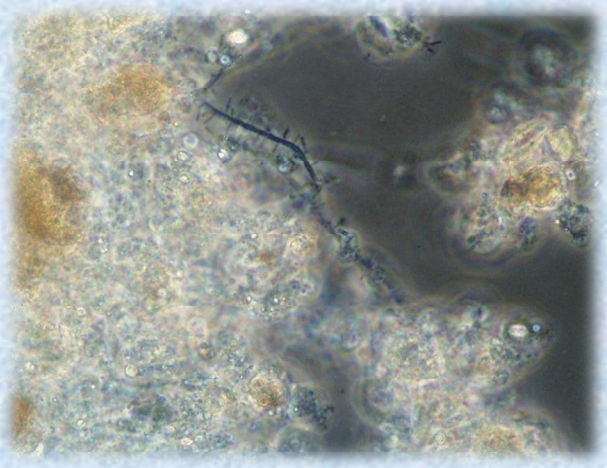
A well-controlled Sour Water Stripper in a refinery wastewater circuit can produce water of considerably more value than what would be warranted for reuse as Desalter Wash Water. This wastewater source can be converted, with some minor polishing treatment, into a valuable supply water source. Via such a conversion in a medium sized refinery for example, a 330 gallon per minute Sour Water Stripper effluent stream can become Boiler Feedwater, saving over ~$400,000 per year in supply water pretreatment costs, and saving over ~$600,000 per year in reduced wastewater treatment processing costs.

The Conservation realized from this approach defines **RWE** Sustainability.

Expert Witness Services

Team **RWE** has extensive experience as Expert Technical Witnesses in a wide range of environmental regulatory enforcement actions. **RWE's** expertise is frequently chosen by clients under these critical circumstances for such tasks as Site Surveys, Process Audits, Data Trend Analysis, Statistical Process Quality Evaluations, and Heat-Material-Financial Balances. Team **RWE's** years of experience in conjunction with each individual's credentials, all under one roof, makes a powerful statement on behalf of its clients.

The Validation realized from this approach defines **RWE** Sustainability.



Market Vision

As of 2012, federal government enforcement of environmental protection focused on the oil, gas, and petrochemical industries has reached its most aggressive stature in history. The resulting increased costs incurred by these industries serve to exert even more pressure on an already stressed economy. On the other hand, inadequate environmental protection brings another set of problems, the detriments of which can be felt for decades. Certainly the Prince William Sound, Alaska and the Deepwater Horizon, Louisiana oil spills, as well as the Hinckley, California groundwater contamination are explicit examples. RWE believes that there is reasonable compromise between environmental protection and economic growth, and that this is increasingly attainable with continued breakthrough of new technologies. The primary mission of RWE is designed to assist clients in either increased reliability in environmental compliance, or increased cost effectiveness of environmental management.

RWE from its inception has maintained a market strategy of minimizing the competition in the design of its offerings. This translates to several important business principles which underlie **RWE**'s success. These are:

- Focus on cutting edge technologies in solving client problems.
- Focus on the experience of **RWE**'s key people in prioritizing applications.
- Focus on an aggressive delivery of knowledge to the client base.
- Focus on disciplined resource allocation in avoiding overly competitive scenarios.
- Focus on key strategic alliances with project partners for comprehensive solution offerings.

RWE is the only company which has been able to respond to the request of the oil refining industry to produce a Wastewater Treatment Training Course for operators and engineers, which addresses the uniqueness of this type of wastewater. This is the only course of its kind available anywhere, and is taught by a team of world renowned experts in the field.

RWE's roots with Simulation Modeling and Chemostatic Reactor technology for biological wastewater treatment plants goes all the way back to 1989, when the first Biokinetic Modeling of an oil refinery Activated Sludge wastewater plant was accomplished. Today **RWE** is the undisputed leader in delivering this process control technology to the oil industry.

RWE's roots with Refinery Sour Wastewater Reuse go all the way back to 2000, when this wastewater stream for the first time was successfully Recycled as Valuable Boiler Feedwater. This work pioneered the foundation of justifications for more recent process advancements which even include a "zero [wastewater] discharge" refinery configuration.

RWE's core consultants over the course of their careers have performed project work in virtually every U.S. Oil Refinery, and a vast number of related Petrochemical Plants. Knowledge of the operations in these plants, coupled with decades of contact with plant personnel, provides **RWE** with a formidable and efficient position in procuring project work.

In comparing **RWE** to competitive engineering firms, perhaps the largest difference lies in **RWE**'s aggressive marketing strategies. Clients cannot benefit from new technology if this knowledge is not delivered to them. The traditional engineering firms typically await calls from clients in order to begin a client interface. **RWE** vigorously initiates the knowledge delivery process across large market segments, and continues to develop creative methodology to accomplish this.

One of the important factors responsible for **RWE**'s rapid growth has been good decision making in the alignment with partners on specific project tasks. This has allowed **RWE** clients to capture blended project benefits with increased focus via a technological integration between RWE and its partners. In addition to 3rd party private company alliances, **RWE** is engaged in long term grants from and partners with several major U.S. Universities, which serves to insure the constant input of advanced technology research to **RWE**'s clients.

The School of Civil and Environmental Engineering and
Refinery Water Engineering & Associates presents

The Eckenfelder Lecture Series Foundation

When:
Monday April 4, 2011

11:30 am - 4:30 pm

Where:
ATRC 102

Oklahoma State University

Oklahoma State University's College of Engineering, Architecture, and Technology is pleased to announce that The Eckenfelder Lecture Series Foundation will make it's first stop on our campus **Monday, April 4, 2011**.

Admission to this event is free for all current students and faculty. There are 40 available slots for attendees from outside universities for a nominal fee. A lunch, sponsored by Autodesk, will be held in the Vogt room in the Advanced Technology Research Center (ATRC) followed by the lecture in **102 ATRC**.

The Lecture Topics that will be discussed:
1. Application of ATP Testing in Oil Refining Wastewater to Improve Bioreactor Process Control of Microbe Inventory.
2. Critical Considerations in Biological Wastewater Treatment Process Control Specific for Oil Refining Wastewater Treatment Plants (WWTP).
3. Direct Correlation of Respirometry to WWTP Biokinetic Constants for Instantaneous Quantitative Process Control in Real Time.
4. Deployment of Thermophilic Bacterial Systems for Superior Oxidation of Recalcitrant Molecules, with Lower Sludge Production & Oxygen Usage.

Speakers Include:
- **Dr. Davis Ford**: The recipient of the first Ph.D. given out by Dr. Eckenfelder.
- **Dr. Enos Stover**: A direct protégé of OSU's renowned Dr. Tony Gaudy, a contemporary and associate of Dr. Eckenfelder.
- **Mr. David Kujawski**: A direct protégé of Dr. Ford and a student of Dr. Eckenfelder.

The Event Schedule is:
- 11:30am-12:30pm: Luncheon & Social.
- 12:30pm-12:45pm: Opening Remarks (Ford).
- 12:45pm-1:30pm: Topic #1 (Ford).
- 1:30pm-3:30pm: Topic #2 (Group).
- 3:30pm-3:45pm: Break.
- 3:45pm-4:30pm: Topic #3 (Kujawski).
- 4:30pm-5:15pm: Topic #4 (Stover).
- 5:15pm-5:30pm: Sponsor Acknowledgement (Group).

For more information on how to:
Register for *OSU* Tour Stop
or
Participate in the SPONSORSHIP PROGRAM

Call or email us today at:
dk@refinerywater.info
(949) 433-0301

STANFORD
CIVIL & ENVIRONMENTAL ENGINEERING

Mr. David Kujawski
December 16, 2011

Dear David,

The Top 500 Innovators program came to the end with a splashing success. Of course the impact of the First 40, to whom we just handed Certificates of Completion, on their universities and institutes and on Poland will be the real measure of our success. Your contribution to this prospect is very important and highly appreciated. If Poland taps to Stanford University and its Stanford Center for Professional Development with the next "batch" of the Top 500 innovators we will want to again knock on your door and ask for your help and cooperation. I sincere hope you will be able and willing to say "yes".

Happy Holliday Season and a Successful 2012

Sincerely yours,

Piotr D. Moncarz, Ph.D., P.E., SCPM[1]
Consulting Professor, Stanford University
Academic Director, Top 500 Innovators at Stanford
Chairman, US-Polish Trade Council

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Phone +1 (650) 688-7205; mobile +1 (650) 208-8249, email: moncarz@stanford.edu

Clients / Partners / Milestones

A partial list of **RWE**'s client base includes:

- Sunoco Refining.
- Chevron-Texaco Refining.
- Conoco-Phillips Refining.
- Total Refining & Petrochemicals.
- BASF Petrochemicals.
- Citgo Refining.
- Dow Chemical.
- Scott's *Miracle-Gro* Pesticides.
- Frontier-Holly Refining.
- CVR Refining.
- GWC Refining.
- Western Refining.
- Great Lakes Chemicals.
- Lion Oil Refining.
- U.S. EPA.
- U.S. Dept. of Justice.

RWE maintains grants and cooperative partnerships with the following U.S. Universities:

- Lamar University, Beaumont, TX.
- Texas A&M University, Kingsville, TX.
- Texas A&M University, College Station, TX.
- Oklahoma State University, Stillwater, OK.
- University of California, Irvine, CA.
- University of Pittsburgh, Pittsburgh, PA.
- Stanford University, Palo Alto, CA.
- University of Hawaii, Honolulu, HI.
- California State University, Fullerton, CA.

RWE is engaged in select project strategic alliances with the following private firms:

- Hydromantis Software Solutions.
- Nalco Chemical Company.
- Kubota Membrane Technologies.
- Envirogen, Inc.
- PWTech, Inc.
- Aqua-Pura Technologies (Hydroxi-REM Licensing).
- Turner Instrumentation Designs.
- MAC Systems Process Water, Inc.
- Encon, Inc.

RWE operates in a cooperative to provide Laboratory Testing and Treatability Studies, covering environmental, chemical, microbiological, engineering, and computer modeling disciplines, at the following locations:

- Lamar University, Beaumont, TX.
- Texas A&M, Kingsville, TX.

RWE MILESTONES

RWE considers the following events as significant Milestones in the company's history to date, which serve as a springboard upon which future growth directions are based:

- Optimization of Refinery Sour Wastewater Reclamation processes for high quality supply water, which provides feasibility and justification specific to alternative design configurations; 2009.
- Market delivery, licensing, and successful beta testing of new Chemical Oxidation Technology, HYDROXI-REM ™, which provides an order of magnitude lower cost effectiveness versus traditional alternative treatments; 2009.
- The first successful application of a refinery wastewater treatment simulation model, which provides accurate prediction of Activated Sludge process performance in a full scale plant operations setting; 2010.
- Procurement of first project work in the area of Hydraulic Fracturing Water Reuse Treatment; 2010.
- Opening of the Gulf Coast Regional Office expansion; 2011.
- Spearheaded the renowned Eckenfelder Lecture Series Foundation delivery of major university events; 2011.
- Secured Grants with 2 major universities which established joint project work partnerships; 2011.
- Secured Strategic Alliances with several major companies in order to support larger scope project work; 2011.
- Procurement of a sole source contract with a federal government agency for expert review of refinery and petrochemical wastewater treatment plant technology; 2012.
- Release of detailed Prospectus for expansion into Hydraulic Fracturing Water Supply and Disposal Brokerage business model; 2012.

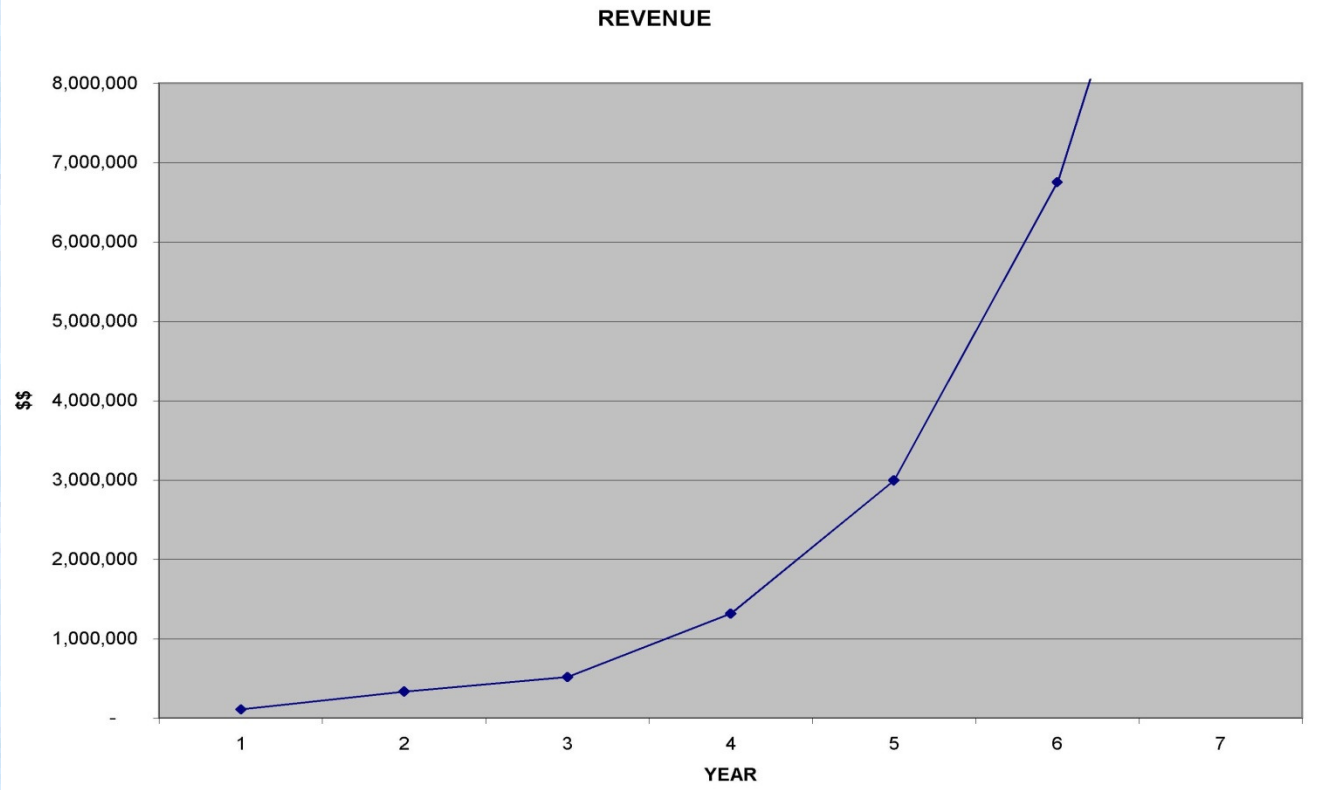
Financial Overview

4 Year Performance with 3 Year Projections Based on Current Structure of RWE

(With No Debt)

	Actual			Current	Projected		
	2009	2010	2011	2012	2013	2014	2015
Gross Sales							
Wastewater Process Engineering & Modeling	112,000	234,000	330,000	710,000	1,625,000	3,550,000	7,750,000
Wastewater Plant Operations	-	100,000	120,000	80,000	160,000	240,000	620,000
Wastewater Expert Witness	-	-	43,000	280,000	780,000	2,080,000	3,200,000
Frac Water Brokerage of Wastewater & Supply Water	-	-	25,000	50,000	75,000	150,000	350,000
Wastewater Design & Water Reuse Engineering	-	-	-	125,000	200,000	325,000	450,000
Refinery Technology Licensing	-	-	-	50,000	75,000	200,000	325,000
Volatile Organic Compounds Modeling	-	-	-	20,000	60,000	90,000	220,000
RCRA Sludge Disposal Studies & Permitting	-	-	-	-	20,000	120,000	350,000
Total Revenue	112,000	334,000	518,000	1,315,000	2,995,000	6,755,000	13,265,000
Cost of Sales							
Sub Contractor Fees	22,400	66,800	129,500	460,250	1,198,000	2,364,250	3,979,500
Account Employee Compensation	-	-	-	105,200	299,500	810,600	1,857,100
Sales Commissions	-	-	-	13,150	59,900	202,650	530,600
Field / Travel Expenses	11,200	33,400	51,800	157,800	299,500	675,500	1,326,500
Total Direct Costs	33,600	100,200	181,300	736,400	1,856,900	4,053,000	7,693,700
Gross Profit after Sales Expense	78,400	233,800	336,700	578,600	1,138,100	2,702,000	5,571,300
Office & Admin Cost							
Office Rental and Equipment	7,200	14,400	14,400	14,400	36,000	36,000	36,000
Utilities / Phones / Communications	1,920	3,840	3,840	3,840	7,440	12,460	18,740
Supplies & Promotional	600	1,200	2,400	2,400	3,600	3,600	4,800
Office Personnel	3,000	9,000	12,000	24,000	36,000	48,000	96,000
Executive Assistant	-	-	-	-	48,000	52,000	56,000
Payroll Taxes	-	-	-	9,790	28,870	72,175	180,440
Legal and Accounting	1,250	12,500	17,500	30,000	35,000	50,000	75,000
Auto Lease / Maintenance	2,012	5,644	12,800	12,800	18,200	24,400	30,600
Health Insurance	540	1,440	1,440	4,800	12,000	24,000	48,000
Auto Insurance	336	3,631	1,392	1,392	2,784	2,784	2,784
Bonds	-	-	35,000	95,000	30,000	-	-
General Liability Insurance	600	3,250	5,820	11,220	16,440	18,500	22,600
Prof. Eng. Liability Insurance	-	-	-	-	96,000	120,000	168,000
Contractor Certification	-	2,500	3,200	5,700	8,900	11,400	17,100
Liability / Key Man Insurance	-	-	-	6,000	6,000	12,000	12,000
Total Office & Admin Cost	17,458	57,405	109,792	221,342	385,234	487,319	768,064
Net Profit	60,942	176,395	226,908	357,258	752,866	2,214,681	4,803,236
Cumulative Net Profit	60,942	237,337	464,245	821,503	1,574,369	3,789,050	8,592,286
Annual Net Profit Percent Change	0%	189%	29%	57%	111%	194%	117%
Debt	-	-	-	-	-	-	-
Assets							
Website	-	10,000	75,000	168,000	-	-	-
Vehicles	-	-	18,500	18,500	-	-	-
Long Term Client Contracts	27,500	162,000	328,000	466,000	-	-	-
Cash	24,000	43,500	31,800	24,500	-	-	-

^RWE acknowledges Deloitte & Touche Consulting for assisting in Financial Analysis


REVENUE
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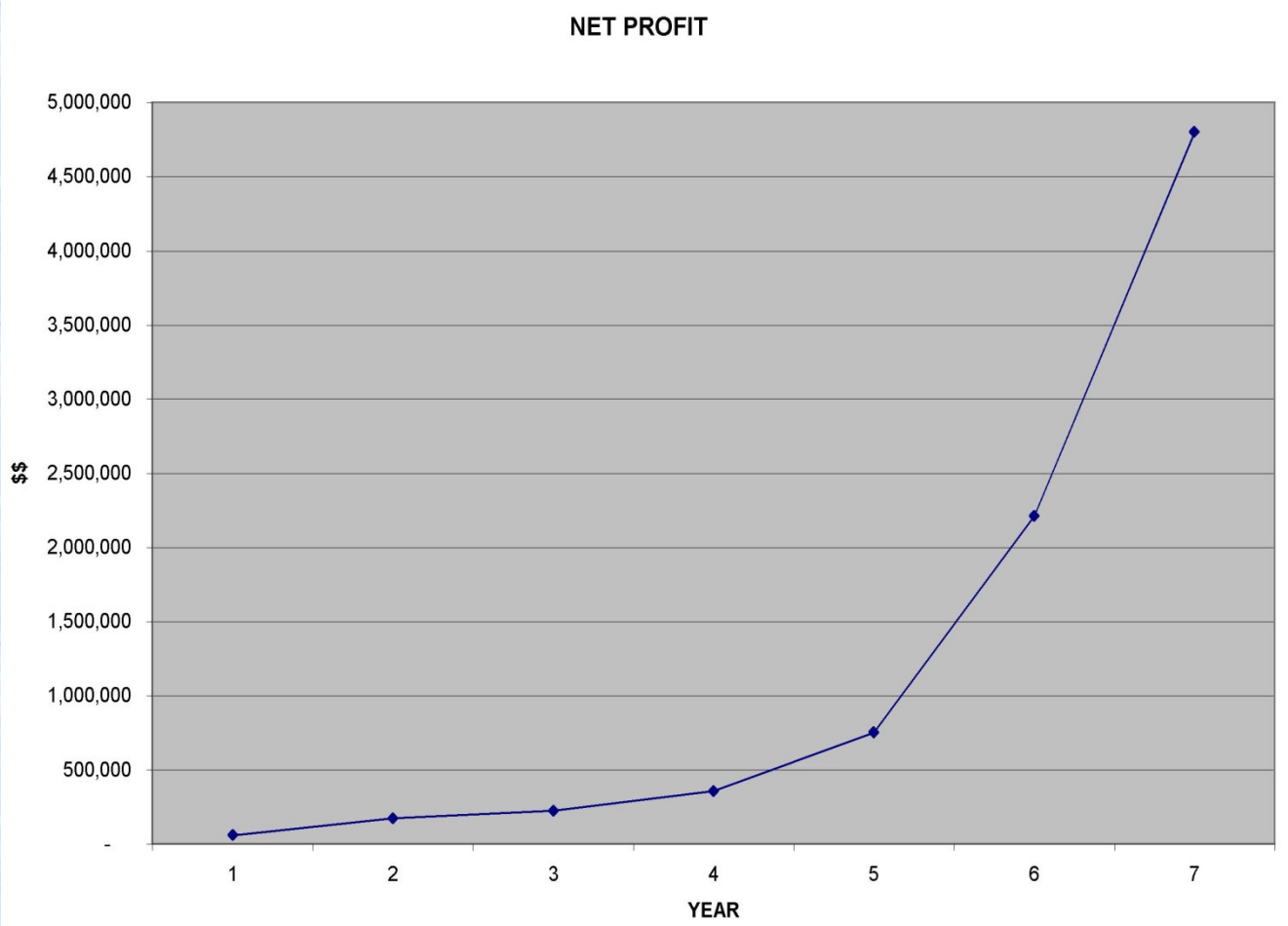
YEAR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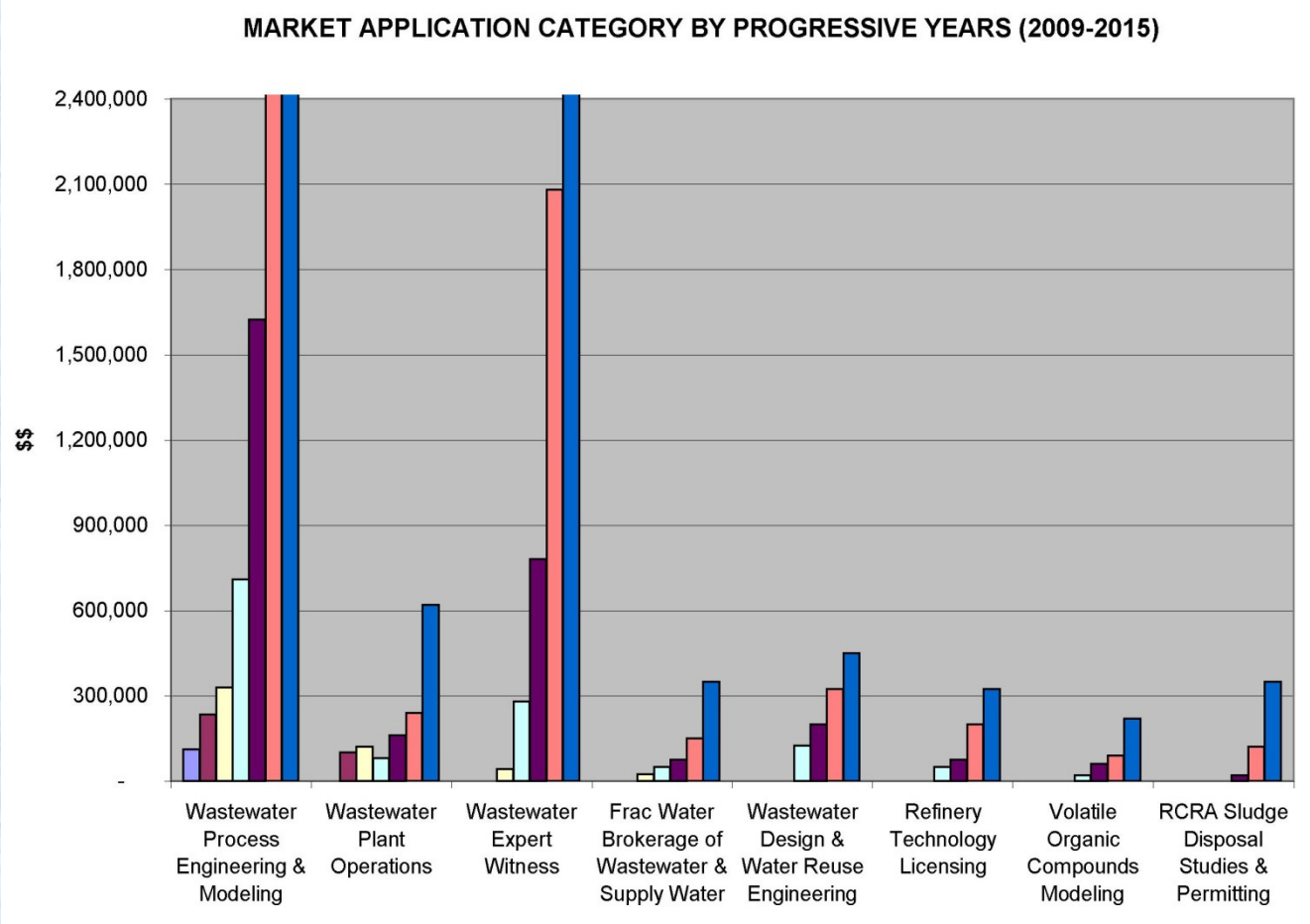
MARKET APPLICATION CATEGORY BY PROGRESSIVE YEARS (2009-2015)
$$
2,400,000
2,100,000
1,800,000
1,500,000
1,200,000
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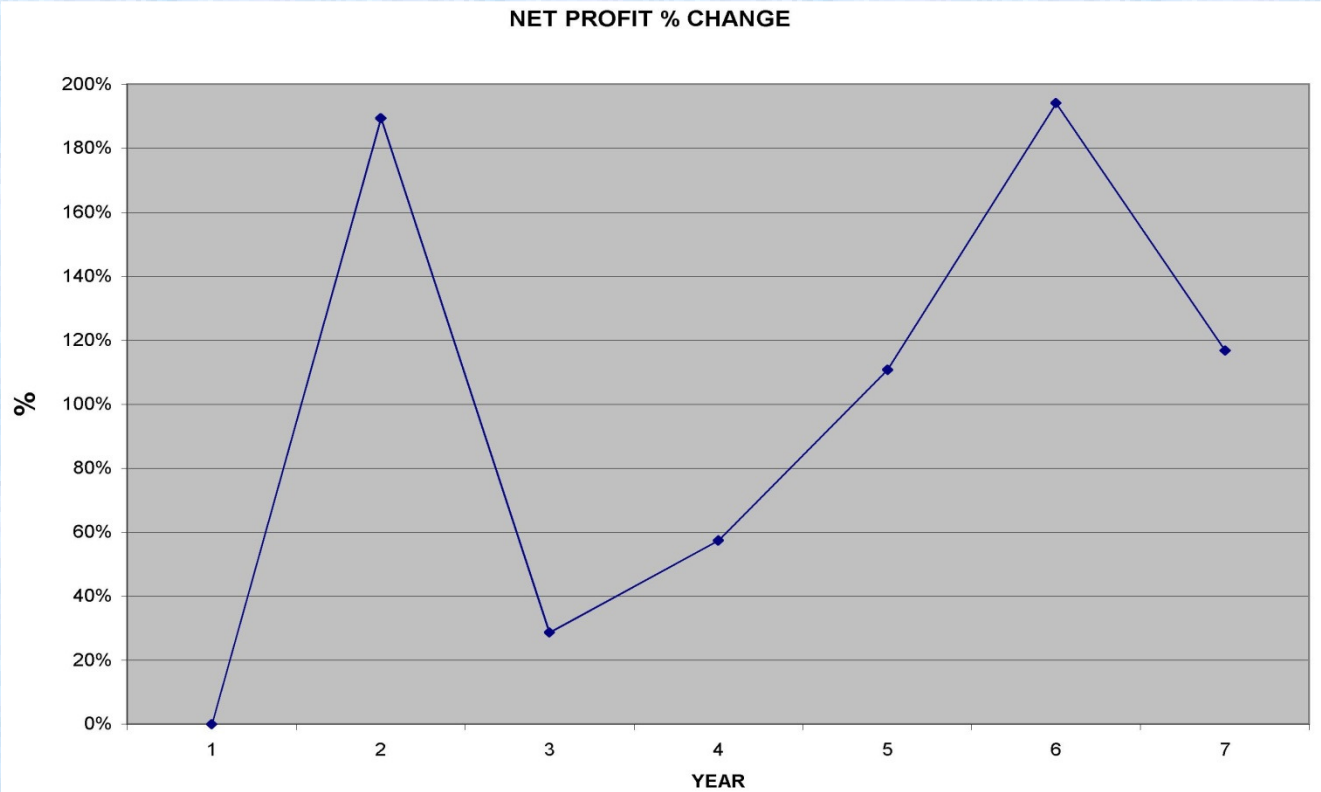
-
Wastewater Process Engineering & Modeling
Wastewater Plant Operations
Wastewater Expert Witness
Frac Water Brokerage of Wastewater & Supply Water
Wastewater Design & Water Reuse Engineering
Refinery Technology Licensing
Volatile Organic Compounds Modeling
RCRA Sludge Disposal Studies & Permitting


NET PROFIT % CHANGE
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200%
180%
160%
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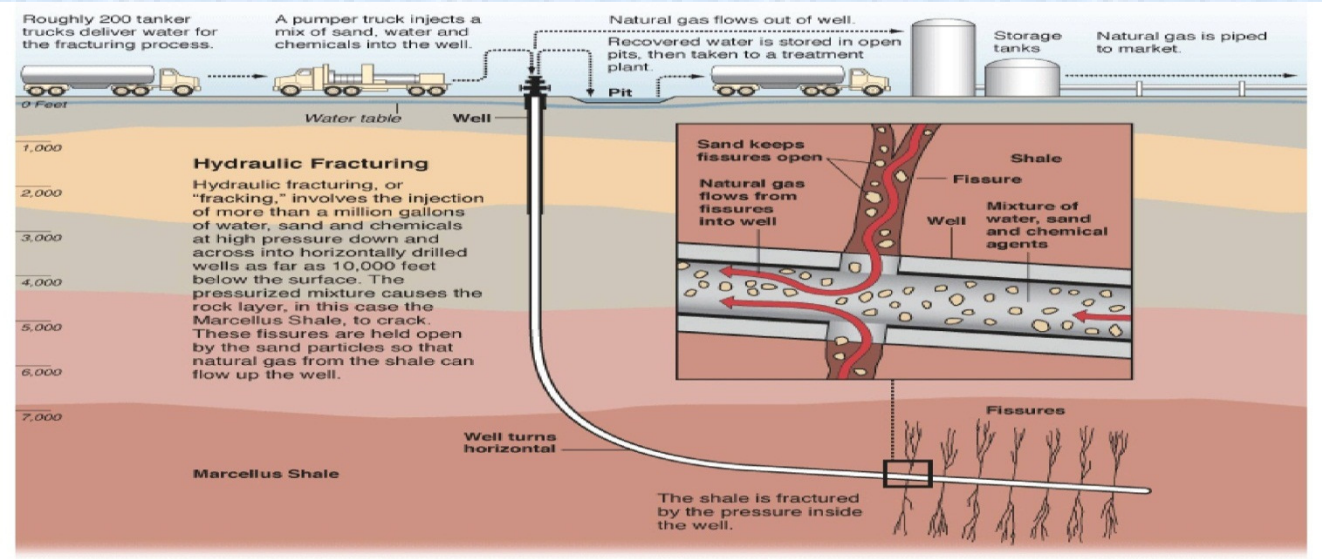
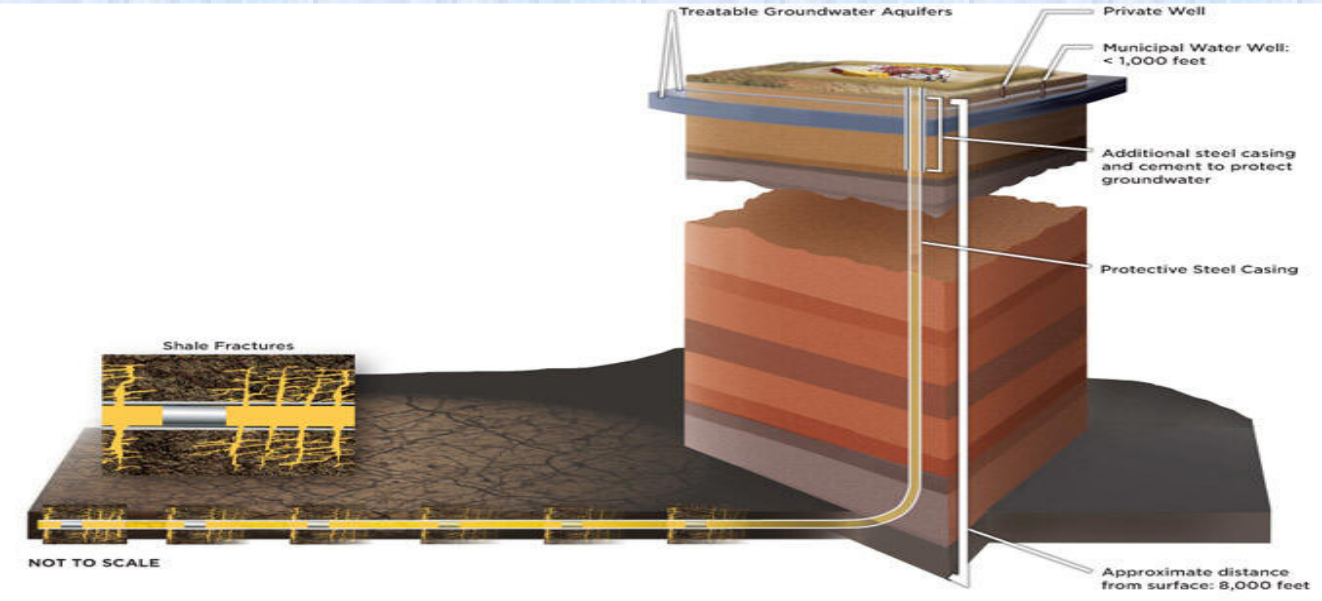
YEAR

"On The Horizon"

In recent years much discussion among scientists has focused on the future water needs of the planet, and the disturbing trends which project substantial shortages of supply. Concurrently much discussion among economists has suggested that water is a commodity which at present lacks a trading platform. Both groups project that it is a likely future outcome that water will ultimately be traded as a commodity, with different grades of water being tendered at various specifications based on supply, treatment, reuse, or disposal requirements. With the very recent developments of advanced drilling techniques, Shale Gas production in the U.S. has emerged as the major energy solution for an improved economy. The deployment of Hydraulic Fracturing Drilling Techniques has made access to these natural gas reserves possible. As the name suggests, this drilling technique is based on the use of water, in substantial volumes. Many questions are currently being debated now, as to such water issues as available supply sources, environmental impact, and disposal guidelines.





With the vast supply of Shale Gas in the U.S., it follows that vast amounts of water will be required. With this new substantial supply requirement in conjunction with dwindling supply trends, the need for a better system of integrating water management globally becomes apparent. It is for this reason that the time for starting to design a commodity trading platform for water has arrived. RWE believes that the first step in designing such a system begins with the development of specifications for supply in various categories of use, and integrated with similar specifications for both reuse and disposal.

For the last year and a half, RWE has participated in Frack Water Reuse projects, and concurrently has conducted substantial market research geared toward designing a Water Brokerage program in select parts of the U.S., which would manage specifications and trading, specific for Frack Water supply, treatment, reuse, and disposal. The first phase in this business model targets the abundant California Shale Gas market in conjunction with its dire water supply water situation.

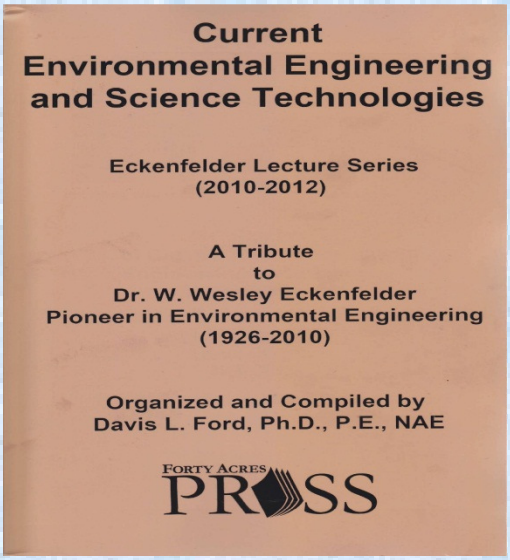
Based on the RWE staff's vast experience and contacts in the oil and gas industry for more than 3 decades, in conjunction with comparable expertise in very virtually every major water and waste treatment technology, this expansion of RWE's mission is a natural progression. RWE believes that this new business area could very well dwarf its existing markets within 5 years. RWE welcomes serious investors to review its Prospectus and related Business Model for participation in this company expansion.

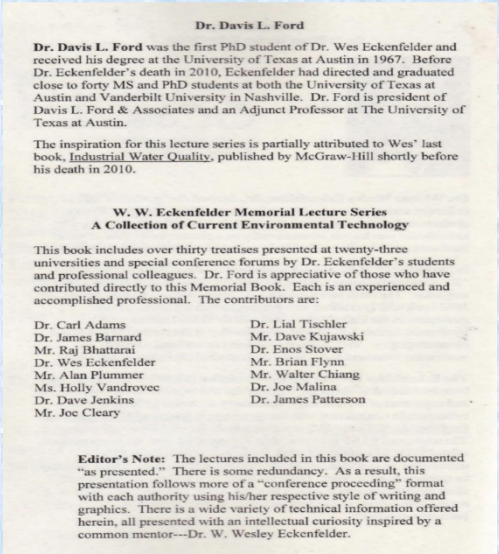
For more on Hydraulic Fracturing, see:

http://refinerywater.net/9.html

Recent Publications & Events

Books





Dr. Davis L. Ford

Dr. Davis L. Ford was the first PhD student of Dr. Wes Eckenfelder and received his degree at the University of Texas at Austin in 1967. Before Dr. Eckenfelder's death in 2010, Eckenfelder had directed and graduated close to forty MS and PhD students at both the University of Texas at Austin and Vanderbilt University in Nashville. Dr. Ford is president of Davis L. Ford & Associates and an Adjunct Professor at The University of Texas at Austin.

The inspiration for this lecture series is partially attributed to Wes' last book, Industrial Water Quality, published by McGraw-Hill shortly before his death in 2010.

W. W. Eckenfelder Memorial Lecture Series
A Collection of Current Environmental Technology

This book includes over thirty treatises presented at twenty-three universities and special conference forums by Dr. Eckenfelder's students and professional colleagues. Dr. Ford is appreciative of those who have contributed directly to this Memorial Book. Each is an experienced and accomplished professional. The contributors are:

Dr. Carl Adams
Dr. James Barnard
Mr. Raj Bhattarai
Dr. Wes Eckenfelder
Mr. Alan Plummer
Ms. Holly Vandrovec
Dr. Dave Jenkins
Mr. Joe Cleary
Dr. Lial Tischler
Mr. Dave Kujawski
Dr. Enos Stover
Mr. Brian Flynn
Mr. Walter Chiang
Dr. Joe Malina
Dr. James Patterson

Editor's Note: The lectures included in this book are documented "as presented." There is some redundancy. As a result, this presentation follows more of a "conference proceeding" format with each authority using his/her respective style of writing and graphics. There is a wide variety of technical information offered herein, all presented with an intellectual curiosity inspired by a common mentor---Dr. W. Wesley Eckenfelder.

Trade Magazines

- Reclamation of Refinery Sour Water for Boiler Feedwater Supply
  - *Processing Magazine – Cover Story* (http://www.waterwasteproc-digital.com/200908/200908#&pageSet=0)
  - *Pollution Engineering Magazine*
    - (http://www.nxtbook.com/nxtbooks/bnp/pe_200907/#/22)
    - (http://www.pollutionengineering.com/CDA/Articles/Feature_Article/BNP_GUID_9-5-2006_A_10000000000000622836)
  - *PennWell's Industrial Water World Magazine*
    - (http://www.waterworld.com/index/display/article-display/361888/articles/waterworld/industrial-water/water-reuse/new-trends-in-oil-refinery-wastewater-reclamation.html)
  - *Environmental Expert Magazine* (http://www.environmental-expert.com/resultEachArticle.aspx?cid=0&codi=51052&lr=1)
  - *Hydrocarbon Processing Magazine* (July 2010) (http://www.hydrocarbonprocessing.com/IssueArticle/2620156/Discover-new-trends-in-oily-wastewater-reclamation.html)

- Biokinetic Modeling of Refinery Wastewater for Enhanced Process Control and Reduced O&M Costs
  - *Processing Magazine - Cover Story* (http://www.waterwasteproc-digital.com/201002/201002#&pageSet=3)
  - *Environmental Expert Magazine* (http://www.environmental-expert.com/resultEachArticle.aspx?cid=37921&codi=78871&level=0)
  - *Pollution Engineering Magazine* (http://digital.bnpmedia.com/publication/?i=33863)
  - *Chemical Engineering Magazine* (May 2011) (http://accessintelligence.imirus.com/Mpowered/imirus.jsp?volume=che11&issue=5&page=64)
  - *PennWell's Industrial Water World Magazine* (September 2011)
    - (http://www.waterworld.com/index/iww-current-issue.html)
    - (http://www.waterworld.com/index/display/article-display/2727055731/articles/industrial-waterworld/volume-11/issue-5/feature-editorial/process-optimization-of-petroleum-refinery-wastewater-facility.html)
  - *Chemical Engineering Magazine* (November 2011) (http://accessintelligence.imirus.com/Mpowered/book/vche11/i11/p14)

University Lectures

1. Oklahoma State University (OSU), Stillwater, OK. - April 4, 2011.
2. Lamar University (LU), Beaumont, TX. - May 2, 2011.
3. University of California, Irvine, CA. - May 20, 2011.
4. Texas A&M-Kingsville, Kingsville, TX. - October 6, 2011.
5. California State University-Fullerton, Fullerton, CA. - October 17, 2011.
6. Stanford University, Palo Alto, CA. - October 21, 2011.
7. University of Pittsburgh, Pittsburgh, PA. - November 7, 2011.

Industry Conference Presentations

- PERF (Petroleum Environmental Research Forum), established by the major oil companies in 1986 to Stimulate Cooperative Research & Development of Technology for Environmental Pollution Control & Waste Treatment for the Petroleum Industry:
  - June 15, 2011, hosted by Chevron Refining.
    http://www.perf.org/images_ee/uploads/Events/2011WWWorkshop/PERF_June_2011_Water_Workshop_Agenda.pdf
  - November 9, 2011, hosted by Conoco-Phillips Refining.
    http://www.perf.org/images_ee/uploads/Events/2011Bartlesville/84th_Agenda.pdf
- ChemInnovations Conference Program, sponsored by renowned Chemical Engineering Magazine (http://www.che.com/issues):
  - September 13, 2011 (http://store.che.com/148.html).
  - October 21, 2010.
- WEFTEC Annual Conference, October 18, 2011
  - http://www.hydromantis.com/news_new.html
  - http://www.refinerywater.net/files/WEFTEC_2011_Session_33.pdf
- Strategic Opportunities in Water Summit Conference sponsored by the 82 year old national Water Quality Association in February 2010.
  http://www.infocastinc.com/downloads_pdf/water_agenda.pdf
- California Water Environment Association (CWEA) Workshop for Industrial Wastewater in March 2010.
  - http://www.cwea.org/conferences/2010/Industrial%20Waste%20Final%20for%20Print.pdf
  - http://www.calendarwiz.com/calendars/calendar.php?crd=cweaevents&nolog=1&jsenabled=1&winH=613) [March 22, 2010]

RWE Biological Wastewater Treatment Portable Pilot Unit

TEAM RWE

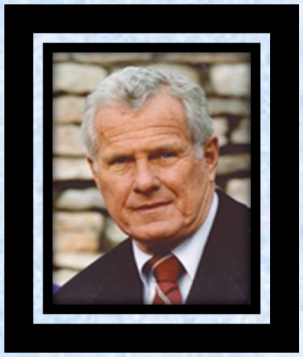
Mr. David Kujawski

Leading the forefront is the founder and C.O.O., Mr. David Kujawski with 32 years of experience in water and waste treatment, Mr. Kujawski has worked in over two hundred industrial plants and forty-six Oil Refineries. Mr. Kujawski is experienced in Refinery Processes on the Oil Side, Refinery Upstream Source Control, Remediation of Contaminated Soils & Groundwater, Hazardous Waste Treatment and Disposal, as well as all aspects of Supply Water and Wastewater Treatment, Wastewater Plant Design and Process Control, Biokinetic Modeling, Boiler and Cooling Water Treatment, Desalting, Oil Side Corrosion and Fouling Prevention, Laboratory Analytical Methods, Polymer Technology, Microbiological Analyses, Benzene-Neshaps Air Quality Compliance, EPA \ State Water Quality Board \ POTW Regulatory Permitting & Compliance. He has recently been featured in 9 major trade magazines for creative Refinery Sour H2O Reclamation and Wastewater Biokinetic Modeling work. In addition to his accomplishments Mr. Kujawski was a key note speaker on the Eckenfelder Lecture Series Foundation Team and has been a guest speaker on many occasions at Oklahoma State University, University California Irvine, and Texas State University at Lamar. Mr. Kujawski has worked with some of the largest companies in the industry such as; Nalco, Betz-Dearborn, Baker-Petrolite, US Filter-Siemens, Chevron El Segundo Refinery, Sybron Biochemical, and Ashland Oil. As well as being the former Process Engineer for Chevron's El Segundo Refinery, Wastewater Operations he also held the position of Associate Vice-President of The Latin America for US Filter's Hydrocarbon Processing Industry. He earned his Chemistry Degree at St. John's University. His graduate work includes Environmental Engineering and Marketing at Arizona State University, University of Texas, and UCLA.

Dr. David Jenkins

Dr. David Jenkins is the Deputy Chairman of RWE's Technical Advisory Committee. Dr. Jenkins is the highly regarded Professor Emeritus formerly associated with Department of Environmental Engineering at the University of California, Berkeley. He is an eminent expert on Filamentous Bacteria & TSS Control in Biological Wastewater Systems. Dr. Jenkins is a leader in the field whose achievements span over five decades and whose accomplishments are respected throughout the industry. As the top ranked expert on filamentous bacteria & TSS control in biological wastewater systems, Dr. Jenkins heads our project team. He and Mr. Kujawski collaborate often, streamlining projects, dissecting treatment plant problems while creating affordable solutions. Dr. Jenkins' reputation for clarity and honesty is renowned and respected. Dr. Jenkins received First Class Honors B.Sc. at Birmingham University, England 1957, earned his Ph.D. in Public Health Engineering from King's College, University of Durham, England in 1960. He has been a Distinguished Lecturer for the Association of Environmental Engineering and Science Professors Foundation and was awarded the Harrison Prescott Eddy Medal.

Dr. Davis Ford



Dr. Ford is the Chairman of RWE's Technical Advisory Committee. Dr. Ford is the esteemed Adjunct Professor in the Graduate School of Civil & Environmental Engineering at the University of Texas. He is the direct protégé of the legendary Wes Eckenfelder, and is arguably the heir apparent for the next generation. The best text book ever written on Biological Wastewater was co-authored by Davis and Wes, and was released in 2008. Davis has consulted to the majority of all Oil Companies Wastewater Operations. Dr. Ford and Mr. Kujawski worked together at Chevron El Segundo and was his Professor for course work at the University of Texas. Dr. Ford continues to practice environmental engineering and has over forty-five years of experience in the field. In addition, he serves on the faculty at The University of Texas at Austin as an adjunct professor, and has published more than one hundred technical papers, co-authored or contributed to ten textbooks, written two biographies and co-authored one children's book. He has lectured extensively throughout the United States and in other countries such as Europe, South America, and Asia. He received his bachelor's degree in civil engineering at Texas A&M University and his master and doctorate degrees in environmental engineering at The University of Texas at Austin and is a Distinguished Engineering Graduate of both Texas A&M University and The University of Texas at Austin as well as a Distinguished Alumnus of Texas A&M. In addition to his other accomplishments he was elected into the prestigious National Academy of Engineering (NAE) and has served as president of the American Academy of Environmental Engineers and chairman of the Academy Ethics Committee. His honorary affiliations include Tau Beta Pi, Sigma Xi, and Chi Epsilon. He currently serves on the board of a publicly owned oil and exploration company (CWEI, NASDAQ) and the Board of the Texas A & M University Press.

Dr. Jerry Lin

Dr. Jerry Lin's expertise is in the biological wastewater treatment and bio-augmentation techniques is diverse, and includes, membrane technology and fouling control, reactor design and bio-kinetic analysis, optimization of biological cultures and treatment processes and biogas production and anaerobic digestion. With over fifteen years in the water and wastewater treatment industry, Dr. Lin is a registered professional engineer in the state of Ohio and has over 100 publications with over 800 peer-reviewed journal citations. He received a B.S.in Chemical Engineering from Tatung University (Taipei, Taiwan; 1991), a Master's degree in Environmental Engineering from Duke University in 1995, and a Ph.D. in Environmental Engineering from the University of Cincinnati in 1998. He was a Postdoctoral Fellow at the Oak Ridge National Laboratory in 1999. Dr. Lin's expertise is in biological wastewater treatment and bio-augmentation techniques, membrane technology and fouling control, reactor design and bio-kinetic analysis, optimization of biological cultures and treatment processes, biogas production and anaerobic digestion. He has been awarded funding for over fifty projects sponsored by the NSF, DOD, EPA, USDA and TCEO.

Dr. Michael Stenstrom

Dr. Stenstrom is the second longest tenured Professor in the Civil & Environmental Department at UCLA, and was the former Chairman of the Department. Dr. Stenstrom is respected as a top authority on wastewater aeration and energy considerations, as well as on the most recent advancements in Biological wastewater process control strategies. He earned his B.S., (1971); M.S., (1972); and Ph.D., (1976) from Clemson University. Dr. Stenstrom has received the following awards and honors: High Honors Undergraduate, Tau Beta Pi, Phi Kappa Phi, Sigma Xi, Chi Epsilon, Undergraduate Scholarships, NSF graduate fellowship, 1969; Engineering Science-Association of Environmental Engineering, Professors Award for the best doctoral thesis relevant to sanitary engr. practice, 1975; American Society of Civil Engineering, Walter L. Huber Civil Engineering Research Prize, 1989; Diplomat, American Academy of Environmental Engineers, 1989; Water Environment Federation, Harrison Prescott Eddy Research Medal, 1992; DOW Chemical Company, Environmental Care Award, 1996; Regional Water Quality Control Board, Innovation in Water Quality, 2002; and The Los Angeles Regional Water Quality Control Board, Water Quality Award, 2005.

Mr. Christopher Spurrell

Mr. Spurrell received his Bachelor of Science Degree from the University of California, Irvine and is a member of the National Association of Corrosion Engineers (NACE) and American Chemical Society (ACS). He has also Co-authored papers on the use of oxidizers in oil refineries, waste reduction, reclaimed water use in cooling towers, leak detection in cooling towers and chemical cleaning. He has twenty-eight years of hands-on experience in Water Treatment Technology and Oil Refinery Process Engineering at Chevron's flagship refinery in El Segundo, California. At the Chevron refinery he was a chemical application specialist and was responsible for the operation of the refinery's sour water stripper. He is a process expert in boiler feed water, cooling water, chemical cleaning, refinery unit operations, refinery unit treatments, odor control, and environmental compliance, as well as refinery upstream wastewater source control. Mr. Spurrell is experienced in hazardous waste treatment and disposal, desalting, oil side corrosion and fouling prevention, laboratory analytical methods, polymer technology, Benzene-Neshaps air quality compliance, EPA \ State Water Quality Board \ POTW Regulatory Permitting & Compliance. Mr. Spurrell continues to work with Chevron in perfecting several patents regarding mercury detection and decontamination techniques.

Mr. Arthur Wong

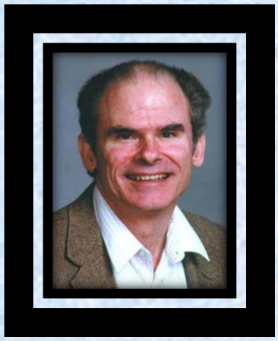
Mr. Wong was one of the first to use Biokinetic Modeling in the field in Oil Refinery Wastewater Plants as a predictive tool for real time process control, as well as use the field determination of the specific plant Biokinetic Constants to evaluate before and after experimentation. Mr. Wong began his career as a chemical engineer pioneering bio treatment designs for high strength phenolic contaminated industrial wastewater treatment processes from aerated lagoons to full scale fixed film bioreactors. Arthur has consulted in hundreds of industrial treatment facilities worldwide such as petroleum refining, petrochemical, steel mill, coking, coal tar distillation, aerospace, automotive, chemical & textile manufacturers, food processing, paper mills, and pharmaceuticals. Mr. Wong graduated Summa Cum Laude, with a M.S. in Chemical Engineering from the University Of Pittsburgh Graduate School. He has spent 26+ years in the environmental engineering field, specializing in design, feasibility, implementation, construction, and operations of infrastructure development projects. Arthur has experience in industrial water and wastewater treatment, remediation of contaminated soil and groundwater sites, and environmental biotechnology. His 1989 Technical Paper from his work at the Caribbean Gulf Oil Refinery remains landmark advancement in Biological Wastewater Treatment even today. He is also one of the first to generate a successful Chemo-static Reactor application in Oil Refinery Wastewater to impact its Biokinetic Constants. Mr. Wong formerly held the chair of Vice-President for US Filter Corp., now Siemens, as well as being the Technology Manager of Research & Development for Sybron Biochemical.

Dr. Lial Tischler

With over 35 years' experience in Industrial Wastewater Treatment Technology, Solid and Hazardous Waste Management, Surface and Groundwater Hydrology, and Water Quality Analysis Dr. Tischler are acknowledged as a top authority in the Modeling of Wastewater Discharge Effects and in the Modeling of Volatile Organic Carbon (VOC) Emissions from Wastewater. He received his Ph.D. in Environmental Engineering directly under the legendary Dr. Wes Eckenfelder and has B.S. in Civil Engineering. His achievements are well acknowledged throughout the field; Dr. Tischler was the former Director of The Texas Water Development Board's Engineering Division, has been the Consulting Advisor to the American Petroleum Institute and has served on the United States Environmental Protection Agency's Stakeholder Committee that reviewed acceptance of Wastewater Treatment VOC Modeling. In addition Dr. Tischler is frequently retained as an Expert Witness in Environmental Litigation and takes part in various roles for client EPA Permit Applications.

Dr. Bill Batchelor

Arthur McFarland Professorship, College of Engineering, Texas A & M University



Dr. Batchelor earned his B.A. in chemical Engineering in 1971 and his M.S. in Environmental Science and Engineering in 1974 from Rice University. He went on to Cornell University where he earned his Ph.D. in Sanitary Engineering in 1976. Dr. Batchelor is a registered professional engineer in Texas. He has received honors from: Truman R. Jones Excellence in Graduate Teaching Award, Zachry Department of Civil Engineering, Texas A&M University, 2007; Charles H. Barclay Jr. '45 Fellow, College of Engineering, Texas A&M University, 2006-2007; Klotz Associates Faculty Fellow, College of Engineering, Texas A&M University, 1997-1998; E.D. Brockett Professor, College of Engineering, Texas A&M University, 1995-1996; Environmental Science and Engineering Fellow, American Association for the Advancement of Science, 1989; Halliburton Professor, College of Engineering, Texas A&M University, 1986-1987; Select Young Research Fellow, Texas Engineering Experiment Station, 1985; Harrison Prescott Eddy Medal, awarded by Water Pollution Control Federation for "Outstanding research contributing in an important degree to the existing knowledge of the fundamental principles of wastewater treatment," 1983; Association of Environmental Engineering Professors, Engineering Science Inc. Bill received another award for best thesis relevant to environmental engineering practice, 1977 and The Standard Oil of Indiana Fellow in Environmental Engineering, 1971-73. Dr. Batchelor started his career in 1976 as an Assistant Professor, Civil Engineering Department, in 1986 became a professor for Zachery Department of Civil Engineering and has been Arthur McFarland Professor, College of Engineering since 2007 for Texas A&M University. In addition from 1992 – 1998 Dr. Batchelor was the Director, for the Institute for Environmental Engineering, for the Texas Engineering Experimental Station and has been a Professor in Water Management and Hydrological Science, since 2005. Dr. Batchelor is a troubleshooter who quickly ascertains solutions to the toughest technical problems facing refinery wastewater treatment.

Mr. Eddie Sechrest

Mr. Sechrest is the Manager of RWEA's Midwest Region Project Teams. His expertise in the remediation of contaminated soils and groundwater, wastewater equipment design, laboratory analytical methods and Benzene-Neshaps air quality compliance are an invaluable compliment and contribution to our spectrum of professional specialists and services. Mr. Sechrest has twenty years of applied experience embracing the complete arena of water and waste treatment technology and for ten years he was the manager of a commercial hazardous waste treatment, disposal and storage facility. He has had ten years of management responsibility in waste water treatment system capital projects.

Dr. Lee Clapp

Texas A&M University-Kingsville

Dr. Clapp is currently an Associate Professor in Environmental Engineering at Texas A & M University where he focuses his research on Membrane treatment processes, Biological treatment processes, wastewater reuse, and groundwater bioremediation and modeling biological treatment processes. Dr. Clapp earned his B.S. in Engineering Physics at the University of Maine-Orono, his M.S. in Water Resources management and his M.S. in Civil Engineering at the University of Wisconsin-Madison. Dr. Clapp is a Post-doctoral Research Associate at the University of Minnesota-Minneapolis and has a Ph.D. in Civil & Environmental Engineering which he also earned at the University of Wisconsin-Madison.

Dr. Peter A. Bowler

University of California, Irvine

Dr. Bowler is a tenured Senior Lecturer in Ecology and Evolutionary Biology within the School of Biological Sciences at the University of California, Irvine. His classes range from upper division biology courses to laboratory field classes, and he has had decades of experience in directing and supervising student research. He is the Director of the UCI Arboretum and Herbarium (IRVC), as well as the Faculty Manager for the UC Natural Reserve System's San Joaquin Marsh and Burns Pinyon Ridge Reserves. He is the Director of the Interdisciplinary Minor in Global Sustainability. Dr. Bowler has been awarded many teaching accolades throughout his career, including, among others Outstanding Professor in Biological Sciences for 1997, 1998, 2001, 2003, 2005, 2009, and 2011, and the 2010-2011 Academic Senate Distinguished Faculty Teaching Award. Besides being an outstanding instructor, he is a prolific publisher and has produced 113 scientific publications, several books and numerous other articles and abstracts. One of his scientific specialties is in designing and implementing ecological restoration and mitigation projects. Dr. Bowler has been on the editorial board of the journal Ecological Restoration for over 10 years and has reviewed manuscripts for over a dozen other professional journals. Dr. Bowler is a strong compliment to **RWE**'s compliance and regulation expertise, and specializes in California and western states regulations and permitting processes. His career in this area encompasses over 30 years of experience and contains strong relationships with state and local agencies, and has facilitated communication and participation between stakeholder and regulatory groups. Dr. Bowler has legal process experience at the administrative state and federal levels, a skill RWEA can utilize for their clients who face administrative or court proceedings.

Dr. Qing Li

University of Hawaii at Manoa
Department of Molecular Biosciences and Bioengineering

Dr. Li focuses on environmental biochemistry and biotechnology at his research laboratory. His goal is to minimize the risks of pollutants and create high value products. Dr. Li's topic areas include proteomics and metabolomics, biodegradation and biosynthesis, insect nutriproteomics and control, analytical/environmental chemistry and fate of pollutants and pesticides. Dr. Li earned his B.S. in Agriculture, Shandong Agricultural University, Shandong Province, P.R. China, his Ph.D. in Agricultural and Environmental Chemistry at the University of California at Davis and his Post-doctoral fell at the University of California Berkley.

Mr. Ty Hintz

Mr. Hintz currently manages RWE's SMART P&ID drawing projects. He has over 16 years' experience with AutoCAD, version 2011 2D & 3D coupled with 8 years Piping Design and P&ID Drawings experience in Oil & Gas upstream pipelines and downstream oil refineries. Mr. Hintz is experienced with Bentley Auto PLANT 3D Piping, Structural, and Project WISE. His other accomplishment are capturing Leika 3D Laser Scans in Kuparuk, Prudhoe Bay, and Trans Alaska Pipeline as well as capturing Pump Station 1 for Conoco-Phillips using Cyclone & Truview. Mr. Hintz earned his Bachelor of Science, Industrial & Management Engineering, at Montana State University, Bozeman.

Mr. Patrick H. Hough, Esq.

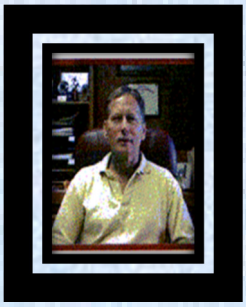
Mr. Hough is a current Officer and Board Member of RWEA. He has held that capacity with the company since its inception in the year 2009. Mr. Hough has served as general and corporate counsel with **RWE** since. During his tenure he has guided and represented **RWE** in complicated negotiations regarding all aspects of the company operation. Under his guidance and representation **RWE** has grown to its current state in the wastewater industry. Mr. Hough attended the University of Missouri-St. Louis and received his undergraduate degree in political science at California State University-Dominguez hills and his Juris Doctorate degree from the University Of West Los Angeles School Of Law. Mr. Hough has hands on experience in refinery operations, literally. He was employed by Chevron USA in El Segundo California as a plant operator. He also served as a senior buyer for the El Segundo refinery while attending law school.

Ms. Julie Gallardo

Ms. Gallardo lends her experience and team building skills to serve and enhance the success of **RWE** and shares the responsibility for such areas as sales management, product development, distribution channel management, public relations, marketing communications (including advertising and promotions), pricing, market research, and customer service. Her duties range from the highly analytical, to the highly creative. Beyond the challenges she is invariably reliant upon resources and has the ability to prioritize projects in areas outside the job sites such as production, information technology, legal, and finance which have a direct impact on achieving the marketing objectives of **RWE**. Ms. Gallardo has twenty five years of business development experience, comprehensive operations management and implementation capabilities and has developed skills which tailor and emphasize specific marketing and sales strategies. To better understand the legal aspects of business she returned to school and earned her degree in law, graduating Magna cum laude. Always on the cutting edge, Julie was the first licensed agent authorized to resale Cellular Phones and Service to the public. During the 90's Ms. Gallardo expanded the specialty retail arena, selling and distributing "Jil Jordan", an all-natural nail kit, product she developed, manufactured and marketed. After this successful endeavor she expanded her business, seeking to be the first company to license and distribute through independent business owners, enabling small entrepreneurs to flourish. With her partners, Ms. Gallardo expanded and developed a variety of Dead Sea products and took their manufacturing and distribution internationally reaching sales of over $28M. Ms. Gallardo is a pillar of Team **RWE** and is instrumental to the growing market strategies and business model developments underway.

Dr. Enos Stover

The Stover Group

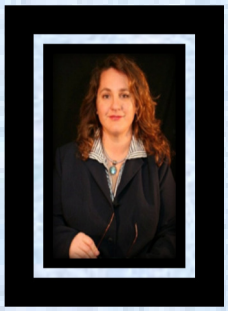


Dr. Stover is a Registered Professional Engineer in Arkansas, Illinois, Kansas, Massachusetts, Missouri, Nebraska, New Hampshire, New Jersey, North Carolina, Oklahoma, Pennsylvania, Texas, and Virginia. Dr. Stover is a Diplomat at The American Academy of Environmental Engineers, is certified by the National Council of Examiners for Engineering and Surveying, and a Registered Environmental Professional Certified in Ground Water Professional (Association of Ground Water Scientists & Engineers). In addition Dr. Stover is an ABC Certified Environmental Operator, Certified in Wastewater Treatment Plant Operations for Oklahoma, Texas and Arkansas. Dr. Stover has several patents which include Biochemically Enhanced Hybrid Anaerobic Reactor, U.S. Patent No. 5,228,995, July 20, 1993; Biochemically Enhanced Thermophilic Treatment Process, U.S. Patent No. 6,036,862, March 14, 2000; Biochemically Enhanced Thermophilic Treatment Process, U.S. Patent 6,660,164, December 9, 2003 and Computer Assisted Identification of Filamentous Bacteria, U.S. Patent No. 6,748,331, June 8, 2004. Dr. Stover earned a B.S. in Civil Engineering, a M.S. in Environmental Engineering as well as his PhD in Environmental Engineering at The Oklahoma State University.

Ms. Cristine Hager Bowler

Ms. Hager Bowler has worked with Mr. Kujawski for 22 years; beginning in 1989 Cristine was a field service technician for Sybron Chemicals, Inc., Biotechnical Division, Western Region and serviced Hawaii and California accounts. During the early 1990s Ms. Hager Bowler provided assistance on field applications of nitrification for ammonia removal in El Segundo, CA. From 1996 to 2000 she was a research assistant for Dr. Peter Bowler, Ecology and Evolutionary Biology Department, Biological Sciences School, University of California, Irvine and conducted research in ecological restoration, assisted and co-authored publications, and implemented monitoring regimes for grant agencies. She maintains a strong connection to UCI. To date, Cristine's varied experience enables her to thoroughly comprehend the company fieldwork, associate needs and agency reports, thereby facilitating information flow, communication and operations. As the Manager of Services and Operations, she oversees company activities and has been part of **RWE** from the beginning. Ms. Cristine Hager Bowler is a University of California, Irvine graduate with a focus on Environmental Analysis and Design. Her specialized education includes California hazardous waste regulations and compliance issues, hazardous waste handling (HAZWOPER) course in accordance with CFR 1910.120, and Cornell Marine Pollution.

Ms. Julia Webb



Ms. Webb is currently **RWE**'s Analytical Methods Specialist and has over seven years' experience providing laboratory technical support and consulting services to users of Hach Company water quality chemical, procedures and equipment. She is a technical expert in the use of UV-Vis Spectrophotometers, Ion Selective Electrodes, turbidimetry, and microbiology as used in water quality analysis for process control and reporting purposes. She has ten years of training and technical support experience, focusing on integrating technical information into useful content for operators and end-users. Ms. Web earner her Bachelor of Science, Biological Sciences at The Colorado State University.

Dr. Paul Labine

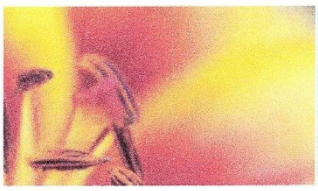
Dr. Labine has 24 years of industrial experience in Boiler & Cooling Water Treatment; 20 plus years' experience in Corrosion Inhibitor and Anti-Foulant Chemical Formulations, Organic Synthesis, Process Simulations, Computerized Process Control, and especially in Membrane Filtration. He is a leading expert in all aspects of Corrosion Theory, Monitoring, Inhibition Techniques, Investigations, and Metallurgical Considerations. He served as the former Director of Research on Oil Refining applications at Baker–Petrolite, as well as performed the same research for Nalco Chemical and W.R. Grace. Dr. Labine has presented numerous technical papers at American Chemical Society, American Institute of Chemical Engineers, NACE, American Society of Testing Materials, International Water Conference. He earned his B.S. in Chemical Engineering as well as a Ph.D. in Chemistry.

Notes

(INSIDE OF BACK COVER)

CALIFORNIA CLEAN TECH OPEN

2006 COMPETITION REPORT



http://www.cleantechopen.com/docs/pdf/CCTO_2006_CompetitionReport.pdf

FINALISTS

Sun Phocus Technologies
Sun Phocus dramatically improves the cost-effectiveness, efficiency, and aesthetics of building-integrated solar power. Sun Phocus intends to sell its patented HoloSunTM solar concentrator to manufacturers of electricity-generating windows, skylights, shingles and spandrel, which compose the $2.75 billion global building-integrated photovoltaics (BIPV) market.
www.sunphocus.com

Viresco Energy, LLC
Viresco Energy is a green energy company established to commercialize a revolutionary hydro-gasification technology developed at the University of California, Riverside. This proprietary

Aqua Pura Technologies
Aqua Pura's mission is to revolutionize the water remediation industry. The strategy is to license HydroxiRem, the lowest-cost method for destroying organic-based water pollution, to existing remediation firms.

A-Z Comp
A-Z Comp has come up with a method of removing oil and hydrocarbons from water that significantly surpasses the filtering efficiency (by at least 100x) and costs less (at least half) than existing methods.
www.azcomp.us

CALIFORNIA CLEAN TECH OPEN
2006 FINALIST

HydroxiRem™

- **HydroxiRem™ is a new technology that is based on Zero Valent Iron being reacted with a Catalyst under controlled conditions, in order to produce Hydroxyl Radicals.**
- **The resulting Hydroxyl Radicals are then directly applied in any Chemical Oxidation reaction that is desired.**
- **In comparison to Hydrogen Peroxide for Redox reactions, Hydroxi-REM is 1/10 th of the cost in use.**
- **In comparison to Activated Carbon for Organics removal, Hydroxi-REM is 1/100 th of the cost in use, and performs a complete destruct unlike Carbon.**
- **Placed 4th at 2006 California Clean Tech Open competition.**
- **http://refinerywater.net/3.html**