



# Almanack

[IEEE Philadelphia Section Website](#)

**Membership in the Following Counties**

**Pennsylvania:** Bucks, Chester, Delaware, Montgomery and Philadelphia.

**New Jersey:** Burlington, Camden and Gloucester

**January 2019** (*Entries are Hyperlinked: point+ctrl+click*)

| Sun       | Mon | Tue                        | Wed | Thu                      | Fri | Sat                 |
|-----------|-----|----------------------------|-----|--------------------------|-----|---------------------|
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|           |     | <b>*New Year's Day</b>     |     | <b>*Life Member Tour</b> |     |                     |
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|           |     | <b>*IEEE Section Night</b> |     |                          |     | <b>*Future City</b> |
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### ALMANACK

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**Publisher:** Emilio M. Salgueiro

**Editor:** Michael A. Mayor, PE

**Section Office:** [sec.philadelphia@ieee.org](mailto:sec.philadelphia@ieee.org)

### IEEE SECTION NIGHT

**Meetings are conducted on the 3<sup>rd</sup> Tuesday of the Month**, eight times per year, January through May and September through November.

### ADMINISTRATIVE COMMITTEE

**Meetings are conducted on the 2<sup>nd</sup> Tuesday of the Month:** January through June and September through December. Members are welcome to attend the meeting only. Reserve a seat by calling Friday before the meeting. **Phone: 484-270-5136.**

## IEEE SECTION NIGHT

### Philadelphia Section Meeting

#### Sponsored by:

The Magnetic (M) and Reliability (R) Society  
Philadelphia Chapters

#### When:

Tuesday, January 15, 2019  
Dinner at 6:00 PM,  
1<sup>st</sup> Speaker at 7:00 PM.  
2<sup>nd</sup> Speaker at 8:00 PM.

#### Where:

Sheraton University City,  
3549 Chestnut St,  
Philadelphia, PA 19104  
(215) 387-8000

*Note: In the event of bad weather please call the Sheraton after 1:00 PM the day of the meeting and ask the front desk if the meeting has been canceled.*

- *Meal Cost: \$25 (students \$15). The meal cost is \$40 but it is subsidized by the IEEE Philadelphia Section.*
- *You can attend the talks only for free (with no dinner), however, we ask that you register.*
- *Parking is paid by the IEEE Philadelphia Section, make sure you have your parking ticket stamped at the meeting.*

### [Registration Link](#)

Or call (484) 270-5136 or email the section office: [sec.philadelphia@ieee.org](mailto:sec.philadelphia@ieee.org)

### **PROFESSIONAL DEVELOPMENT HOURS (PDH)**

*PDH Certificates are free for IEEE members. For non-members, the cost is \$9 per certificate. You can pay during registration or by check at the meeting.*



# First Talk

## Predicting and Trading Elections

**Dr. Daniel (Dan) Loeb**  
**Quantitative Research Analyst at**  
**Susquehanna International Group**

**Abstract:** Dan Loeb will share how trading securities intersects with elections and how his work at Susquehanna International Group (SIG) is affected by the decisions made on Election Day. He will discuss SIG most recent experiences with this type of trading during recent elections in the United States and elections abroad including Brexit.

**Biography:** At first my career took a traditional academic route, I earned a Bachelor of Science Degree in Mathematics from Caltech. Professor Richard Wilson introduced me to



discrete mathematics which would eventually become my thesis topic at MIT. Meanwhile I added breadth to my mathematical training by taking a number of computer science and economics classes. Caltech studies microeconomics and game theory from a very mathematical approach. In fact I often found the mathematics in my economics courses more challenging than the mathematics in my math courses: maximizing a function of a dozen variables with several constraints, whereas in math after getting past explicit examples in 2 or 3

variables we always went straight to the "general case".

At MIT, I studied umbral calculus (a branch of combinatorics) under the direction of Prof. Gian-Carlo Rota and received my Ph.D. in 1989. I then taught and continued my research at the University of Bordeaux in France.

In 1996, I was looking to take a sabbatical and return for a while to the United States. A coauthor of mine Walter Stromquist encouraged me to consider non-academic employment, so I applied to Daniel H. Wagner Associates where he was in charge of their Pennsylvania office.

My first projects at Wagner Associates were redesigned the corporate website (which was a great initial project since it exposed me to the wide variety of mathematical work done at the fine) and to the evaluation of a credit risk model used by BMW based on fuzzy logic.

However, I soon started working in mathematical finance for the Susquehanna International Group for their newly created Statistical Arbitrage Group in their Quantitative Research Department. As this project continued to be successful and grew in size, it took up all of my time and I eventually left Wagner Associates to work fulltime at Susquehanna where I am now responsible for a group of over a half-dozen mathematicians developing proprietary trading strategies with which to invest to the partner's money.



## Second Talk

### *Costas Arrays: What, Why, How and When*

**James K. Beard, Ph.D.**

Engineering Consultant

**Abstract:** Costas arrays are special permutation matrices that provide minimum crosstalk between two signals that are mismatched in either timing or frequency. Their original purpose and still their most important use is as a frequency hop scheme for communications and radar signals. Costas arrays can be searched over orders up to about 20, generated through number-theoretic equations, or obtained through databases. A database on IEEE DataPort provides all known Costas arrays through order 1030. We will look at a simple frequency-agile waveform that uses a Costas array to select the frequencies of the pulses.

#### **Biography:** (M'64 LM'04, LSM'05), ORCID



ID\* 0000-0003-4430-8704 was born in Austin, TX in 1939. He received a BS degree from the University of Texas at Austin in 1962, an MS from the University of Pittsburgh in 1963, and the Ph. D. from the University of Texas at Austin in 1968, all in

electrical engineering. He is a member of Phi Eta Sigma, Eta Kappa Nu, Tau Beta Pi, and Sigma Xi. He studied for his Ph. D. under a GSFR Fellowship (matched U. Texas Austin and Ford Foundation funding, administered by U. Texas Austin) and completed his Ph.D. under an NSF Fellowship.

Between 1959 and 2004, he worked in Government laboratories, industry, and as an individual consultant. Employers include precursors or current divisions of Northrop Grumman, Raytheon, and Lockheed Martin, most recently Lockheed Martin in Moorestown, NJ. Dr. Beard is the inventor of record for US Patent No. 6,870,501 awarded March 2005, "Digital Radio Frequency Tag" assigned to Raytheon Company. He is currently an individual consultant based in Medford, NJ near Philadelphia. He is the author of a number of papers and a book, "The FFT in the 21st Century" (ISBN 978-1402076756, Springer-Verlag, 2003).

Current research interests include system engineering solutions to homeland defense issues, estimation and decision theory, radar and communications concept and waveform design, and digital radar concepts. He was Publications Chairman for FUSION2005. Dr. Beard is also a member of the AIAA.

\* The ORCID ID is a nonproprietary alphanumeric code to uniquely identify scientific and other academic authors and contributors.



## MESSAGE FROM THE CHAIR

*Emilio M. Salgueiro, Chair, IEEE Philadelphia Section*

Dear fellow IEEE Philadelphia Section members, I feel honored to be your 2019 Chair, I want to thank Peter Silverberg, who is now our new Past Chair, all members of the ADCOM, Chapter Chairs, Affinity groups and Student branches for their hard work during the last couple years.



I have served as an active IEEE volunteer for many years, having served on multiple Boards and Committees. Region 2 Secretary, IEEE-USA PACE Committee. Philadelphia Section. I have a good understanding of our Region's structure at both Regional and Technical levels. I worked as a Consulting Engineer at Unisys, today I work at Temple University school of ECE as an Adjunct Professor.

My goals are Member retention and recruitment, emphasize on high quality publications that meet the needs of practitioners, incentivize moderated panels, tutorials to allow members remain competitive, Networking and Career opportunities to provide direct value to our members, and focus on members' and volunteers' needs.

I want to extend an invitation to all members in the Section to volunteer and

participate of the many activities planned for this year. 2019 is going to be a challenging year and I would like to count with everyone's help to meet the goal of being one of the most successful sections. The activities are published in our monthly online publication Almanack in our website. As an example, we have the Life Member Tour on January 3, ADCOM meeting on January 15, Future City Judging on January 19, and IEEE Night on January 22.

Membership Development goals are created for each Section for both recruitment and retention. If we could have each member recruit a member, we could potentially double our membership. One of the values of membership is to be able to network with other members, which is key to advance your professional development. Did you hear of the program Member-Get-a-Member program? Consider sharing your IEEE membership and get rewarded for doing so. For each new member you recruit during the 2019 membership year (16 August 2018 through 15 August 2019), you earn an award that can be used toward IEEE dues, IEEE Society fees, or the purchase of books and publications (excludes merchandise and products).

I am very interested in hearing from our members. I plan to have an open link in our website to hear from you, also I am available thru email: [emsalgueiro@ieee.org](mailto:emsalgueiro@ieee.org)



## IEEE Section Life Member Event joint with PSPE PA Society of Professional Engineers Tour of Southeast Wastewater Treatment Plant on:

**Thursday, 1/3/2019, 6:00 PM – 7:15 PM**

**Organized by: Joseph F. Maida, PE, P.Eng. LEED AP**

I am confirming the PA Society of Professional Engineers tour of the Southeast Wastewater Treatment Plant on Thursday, 1/3/19 from 6:00 - 7:15 PM. Management staff at the treatment plant have approved the tour.

We appreciate that you have selected a tour of the Philadelphia Water Department's wastewater treatment process, allowing us to showcase our engineering achievements in water pollution control. Drew Brown will lead the tour and provide a written description of the activity for CE credits, as requested.

The tour will include a description of the engineering involved with sewage collection and pumping, screening, sedimentation processes, aeration and biological reduction, final sedimentation, and disinfection. The plant will provide powerful flashlights for the tour, so participants have a good view of the machinery and bays used in the process.

### Attached documents to share with participants:

- PWD Sewage Treatment Process - info graphic of the process for cleaning sewage
- Microorganisms in Activate Sludge - description of organisms used to clean sewage
- PWD Sewage Treatment - City Districts - areas of City served by each treatment plant
- PWD Sewage Treatment - Regional Districts - regional areas served by treatment plants
- Directions to SE Treatment Plant - note: parking lot is inside the main gate to the left
- PWD Release Waiver:

**[Link to Documents](#)**

**[Link to Waiver](#)**



***Everyone must sign and submit the attached PWD Release Waiver at the start of the tour.***

**Please inform participants of the following conditions for the tour:**

At 6:00 pm participants will enter the inside gate of the plant and proceed to the opposite end with Drew to begin the tour. Late arrivals may not be able to participate, because everyone inside the gate must be escorted by a PWD staff person.

Sections of the tour will be outside, so everyone must dress for the weather of the day. If the temperature is below 35 degrees, or snow has fallen, and Plant staff has not been able to clear the walkways, or walkways are icy, we will have to cancel the tour.

If it is very cold, Drew will stick to the tunnel that runs through the plant as much as possible, going up and down stairs to take quick peeks at the bays where useful. Any-one with a problem with stairs should “self-select” out of the visit.

Everyone must sign and submit the attached PWD Release Waiver at the start of the tour.

***Eating, drinking, and photography are not allowed on the tour.***

Thanks,

Environmental Educator  
Philadelphia Water Dept. Public Affairs and  
Fairmount Water Works Interpretive Center

**Register Here**



Vol. 64, No. 01

January 2019

## Notable Events



*WIE Appreciation Dinner*



Vol. 64, No. 01

January 2019



*Past Chair, Peter Silverberg, recognizing the Sheraton Hotel Employees contribution to making IEEE events successful*



# Delaware Valley Science Fairs (DVSF)

## DVSF Information

Founded in 1949, The Delaware Valley Science Fairs, Inc., is a non-profit organization sponsored by area companies, foundations, universities and individual donors. One of the oldest and largest Fairs in the country, DVSF embraces a philosophy is that students learn science by doing science. In the process, students learn how to think and develop critical problem-solving skills that they will need for careers, college

and citizenship. Our mission is to bring parents, teachers and industry together to stimulate and nurture young people so that they can grow and develop into contributing members of the community by providing the scientific work force needed for the future. We provide mentoring and teacher training to facilitate participation in this activity.

## *Learn More About Volunteering for DVSF*

# Call for Nominations-2019 Engineer of the Year

*Kickoff event – Thursday, February 14*

*Young Engineers Social – Tuesday, February 19*

*Nominations must be submitted by one of the technical and professional societies in the Delaware Valley by Friday, October 20, 2018.*

[\*\*Click here for more information on 2019 Engineer of the Year Nominations\*\*](#)

# Call for Nominations – 2019 Young Engineer of the Year

*Do you know an outstanding young engineer deserving of recognition?*

*Then YOU are invited to submit nominees for the 2019 Young Engineer of the Year (YEOY) Award.*

[\*\*Click here for more information on 2019 Young Engineer of the Year Nominations\*\*](#)



Website: <https://futurecity.org/>

Email Address: [volunteer@futurecityphilly.org](mailto:volunteer@futurecityphilly.org)

It's that time of year again. I can't believe it's October already! The school year is off to a great start for the Future City Competition. To date, 49 schools have signed up and have started designing their cities of the future.

The Philadelphia Regional Future City Competition is in urgent need of mentors and needs your help! If you have any time available to share your experience with students who are learning about what engineers and planners do, please consider volunteering!

The Future City Competition is a project-based learning program for 6th through 8th grade

**Please consider volunteering as a mentor! Here is some helpful information:**

**1. What is a Mentor?** – A Future City Mentor is a volunteer who is an engineer, planner or student who shares their experience, advice, guidance, and technical assistance to a group of students who are working towards completing the competition deliverables (SimCity virtual city, essay, model construction, and presentation). For more information about your role as a mentor go to:

<https://futurecity.org/participants/mentors>.

students around country that introduces them to the principles of engineering while allowing them to use teamwork and creativity to solve problems that face the world. The program helps advance STEM learning in Middle Schools in our region and encourages students to consider careers in engineering in the future. In recent years the regional competition has grown to include over 500 participating students and teachers in the Philadelphia area, but we are short on volunteer mentors. This is a great way to give back to the community and share your experience with the next generation of engineers!

- 2. Where are Mentors Needed?** - Mentors are needed at Middle Schools throughout the Greater Philadelphia region. Currently, the following schools are in need of mentors:
- Agora Cyber Charter School - Phoenixville, PA
  - Centennial School District - Southampton, PA
  - Charles Boehm Middle School - Yardley, PA



- Elizabethtown Area School - Elizabethtown, PA
- ET Richardson Middle School - Springfield, PA
- Fleetwood Area Middle School - Fleetwood, PA
- Gwynedd Mercy Academy Elementary School - Spring House, PA
- Little Town Christian Robotics Academy - Chester, PA
- Maria Kaupas Academy - Scranton, PA
- Mill Creek Elementary - Warrington, PA
- Mother Teresa Regional Catholic - King of Prussia, PA
- Mount Aviat Academy - Childs, MD
- New Hope Solebury Middle School - New Hope, PA
- St. Albert the Great School - Huntington Valley, PA
- St. Elizabeth Parish School - Uwchlan, PA
- St. Mary Interparochial School - Philadelphia, PA
- St. Peter's School - Philadelphia, PA

3. **Time Commitment** - The schools in need of mentors could use any help you can offer! There are plenty of ways to help, including meeting with the class in person, using technology such as Skype or GoToMeeting for virtual meetings, or corresponding via email. Normally, the teachers could use help every other week for the first month or two, then more frequently as the deadlines approach.
4. **Schedule** – Mentors are needed as soon as possible, as these schools are already working towards their first deliverables in mid-December. The competition is held on January 19, 2019 at Archbishop Carroll High School in Radnor, PA. Mentors are assigned on a first-come, first-served basis. Please let us know if you have a preference.
5. **Spread the Word** – These schools are in desperate need of help from engineers and planners! Please share this email with friends/coworkers who may be interested. And please feel free to partner up with a colleague, coworker, or friend to work as a team in serving as co-mentors.



For more information on mentoring, please contact: Mike McAtee at:

**[mjmcatee@urbanengineers.com](mailto:mjmcatee@urbanengineers.com)**

There are also volunteer opportunities on the day of the competition (January 19, 2019), including special awards evaluator, preliminary judge, and general volunteer. We also have a need for volunteers in advance of the competition, including virtual city judge and city essay

Karen R. McManuels, PE  
Philadelphia Regional Volunteer Coordinator  
**[kmcmanuels@aeceng.net](mailto:kmcmanuels@aeceng.net)**  
610-688-3980 x132

judge. If you are interested in getting involved, please sign up at:

**<http://www.futurecityphilly.org/fcvollops.html>**

Any questions please contact me via e-mail or phone. Please feel free to forward this e-mail to your friends, co-workers, and technical society members.

## ***Check Out Last Year's Winner***

### **2018 Queen of Angels**

- 2nd Place: Downingtown Middle School
- 3rd Place: Lionville Middle School

### **Honorable Mention:**

- St Andrew School
- Mount Aviat Academy
- Grey Nun Academy

### **People's Choice:**

- Drexel Middle School



# iPraxis

## ***THE POWER OF VOLUNTEERING!***

***Through in-class mentoring, project-based learning, science fairs, and after-school programs, our iPraxis volunteers (Scienteers) help to increase knowledge and understanding of STEM subjects and the opportunities they provide.***

**iPraxis** works to inspire middle school aged students in underserved Philadelphia communities to explore science, technology, engineering, and mathematics (STEM) by connecting them with professional scientists and providing hands-on learning experiences.

Our commitment to STEM education is the foundation of our programs and initiatives. We believe all students, regardless of their backgrounds, should be given the opportunity

to learn how to investigate, problem solve, and create by putting their ideas into action. iPraxis brings together experts and students to explore how STEM is fundamental to everyday living and our future well-being -- from protecting the environment to curing illnesses.

iPraxis relies on volunteer STEM professionals and students, on donors and supporters, and on teachers, parents, and students to fulfill its mission.

**iPraxis Website**

**iPraxis Newsletter**



**ACE MENTOR PROGRAM**  
ARCHITECTURE • CONSTRUCTION • ENGINEERING

**GREATER PHILADELPHIA**

A large graphic featuring the words "GIANT JENGA TOURNAMENT" in stylized, colorful 3D letters (yellow, pink, blue) set against a background of abstract, overlapping geometric shapes in shades of yellow, gold, and white.

Tower Above the Competition!



Test your steady hand and sense of balance by playing Giant Jenga with your friends in the design and construction industry! Just like the tabletop game only super-sized. The tallest tower winner gets bragging rights.

**The winner of the tournament will also have the opportunity to name an ACE Scholarship - which will be presented at the 18th Annual ACE Scholarship Breakfast on Thursday, May 23, 2019.**

Proceeds from our Giant Jenga Tournament will go to scholarships for our current High School students - AND - ACE Alumni currently enrolled in school and focusing on an A-C-E related career path.



**Help us ENGAGE, EXCITE and ENLIGHTEN students about the design + construction industry!**



**Teams fill quickly - Register Today!**

The ACE MENTOR PROGRAM of GREATER PHILADELPHIA is an affiliate of a national non-profit organization. The mission of ACE (Architecture, Construction, Engineering) is to engage, excite, and enlighten high school students to pursue careers in the integrated construction industry through mentoring and to support their continued advancement in the industry through scholarships and grants. Students are recruited from both public and private high schools throughout Philadelphia and the suburbs, with special efforts made to reach the traditionally underrepresented populations of women and minorities.

**FOR MORE INFORMATION**, please contact our Affiliate Director Tiffany Millner at:

[easternpa@acementor.org](mailto:easternpa@acementor.org)!



## PHILADELPHIA SECTION PLANNING CALENDAR

Current Month: January 2019

| Date            | Activity                                    |
|-----------------|---|
| DATE            | ACTIVITY                                    |
| <b>January</b>  |   |
| Jan 15          | ADCOM                                       |
| Jan 19          | Future City judging                         |
| Jan 22          | IEEE Night                                  |
| <b>February</b> |   |
| Feb 12          | ADCOM                                       |
| Feb 14          | Engineers Week kickoff event                |
| Feb 19          | DVEW Engineers Social                       |
| Feb 19          | IEEE Night                                  |
| Feb 28          | Treasurer's Report to IEEE                  |
| <b>March</b>    |   |
| March 12        | ADCOM                                       |
| March 19        | IEEE Night                                  |
| <b>April</b>    |   |
| April 3         | Science Fair judging (Oaks PA)              |
| April 9         | ADCOM                                       |
| April 13        | Awards Banquet                              |
| April 16        | IEEE Night                                  |
| <b>May</b>      |   |
| May 1           | New members get 8 months for the price of 6 |
| May 14          | ADCOM                                       |
| May 21          | IEEE Night                                  |
| June 11         | ADCOM                                       |
| <b>June</b>     |   |
|                 | To be provided                              |
| <b>July</b>     |   |
| July 10-12      | American Control Conference                 |



## PHILADELPHIA SECTION NOTES

### IEEE PHILADELPHIA SECTION OFFICERS

Chair: Emilio M. Salgueiro: [emiliosalgueiro@ieee.org](mailto:emiliosalgueiro@ieee.org)

Vice Chair: Mark Soffa: [msoffa@kns.com](mailto:msoffa@kns.com)

Treasurer: Robert Johnston: [rlj1620@gmail.com](mailto:rlj1620@gmail.com)

Secretary: J.J. Gingerich, Jr: [jjgingerich@gmail.com](mailto:jjgingerich@gmail.com)

Past Chair: Peter Silverberg: [psilverberg3@comcast.net](mailto:psilverberg3@comcast.net)

### ADMINISTRATIVE COMMITTEE (ADCOM)

ADCOM meets the second Tuesday of the month at the Sheraton University City, 3549 Chestnut St, Philadelphia, PA 19104. Members are welcome to attend. If you want to attend, reserve a seat by calling the IEEE Section Office by the Friday before the meeting.

### DIRECTORIES

**ADCOM Members   SECTION Chapters   Chapter Chairs Responsibilities**

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### IEEE Philadelphia Section Main Office:

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111 Presidential Blvd., Suite 231, Bala Cynwyd, PA 1004, Phone: 484.270.5136

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### ADVERTISEMENTS – Contact: [michael.mayor.pe@ieee.org](mailto:michael.mayor.pe@ieee.org).

The IEEE Philadelphia Section encourages placement of technical, professional, promotional and commercial advertisements. The Almanack is published ten times a year and is read by approximately 4,000 members in over 150 key industries.

The following rates are designed for the occasional advertisers. A more comprehensive set of benefits is offered in the Sponsorship Program (next page).

#### Almanack, Website, Email Blasts

**One Month Full Page: \$200.-**

**Three Months Full Page: \$400.-**



## PHILADELPHIA SECTION SPONSORSHIP PROGRAM

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|                                     | <b>Platinum</b>  | <b>Gold</b>  | <b>Silver</b>   | <b>Bronze</b>   |
|-------------------------------------|--|--|---|---|
| <b>Cost per Year</b>                | <b>\$3,500</b>   | <b>\$2,500</b>   | <b>\$2,000</b>  | <b>\$1,000</b>  |
| <b>Awards Banquet<sup>1</sup></b>   | <ul style="list-style-type: none"> <li>• Full Table-10 tickets</li> <li>• Full page Awards Brochure</li> <li>• 6-ft Exhibit Table</li> </ul> | <ul style="list-style-type: none"> <li>• 6 tickets</li> <li>• Half page Awards Brochure</li> <li>• 6-ft Exhibit Table</li> </ul> | <ul style="list-style-type: none"> <li>• 4 tickets</li> <li>• Quarter page Awards Brochure</li> <li>• 6-ft Exhibit Table</li> </ul> | <ul style="list-style-type: none"> <li>• 2 tickets</li> <li>• Quarter page Awards Brochure</li> </ul> |
| <b>IEEE Almanack<sup>2</sup></b>    | 12 Months<br>Full Page   | 9 Months<br>Full Page  | 6 Months<br>Full Page   | 3 Months<br>Full Page   |
| <b>IEEE Website<sup>2</sup></b>     | 12 Months<br>Full Page   | 9 Months<br>Full Page  | 6 Months<br>Full Page   | 3 Months<br>Full Page   |
| <b>IEEE Email Blast<sup>2</sup></b> | 12 Months<br>4 Times / month<br>Full Page  | 9 Months<br>4 Times / month<br>Full Page   | 6 Months<br>2 Times / month<br>Full Page  | 3 Months<br>1 Time / month<br>Full Page   |

### NOTES

<sup>1</sup> The Awards Banquet is held annually at the prestigious Union League of Philadelphia. The Awards Banquet is a major social occasion, recognizing those honored by the Institute & the Section for their contributions & those honored by organizations with mutual interests of IEEE.

<sup>2</sup> Advertisement(s) are prepared by the Sponsor and can contain links to the Sponsor's website and/or specific events. Advertisement(s) can be different one for each month of benefit or the same for one or more months.



# 2019 American Control Conference: Call for Papers

July 10-12, 2019, Philadelphia Marriott Downtown, Philadelphia, PA (USA) (<http://acc2019.a2c2.org/>)

## Operating Committee

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[r\\_fierro@unm.edu](mailto:r_fierro@unm.edu)

### Vice-Chair: Invited Sessions

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The 2019 American Control Conference will be held Wednesday through Friday, July 10–12, at the Philadelphia Marriott Downtown, located in the heart of Center City, Philadelphia. Philadelphia is the birthplace of American democracy, and the home to the creation and signing of the Declaration of Independence and the Constitution. It is also the City of Brotherly Love and considered one of the most European-like cities in the USA, captured by the across-the-street Reading Market and little Italy neighborhood. The city features a cultural diversity of food (and also the original cheesesteak), exhibitions, and museums for all tastes throughout the year, as well as outdoor concerts and festivals during summer.

The ACC is the annual conference of the American Automatic Control Council ([AACC](#)), the U.S. national member organization of the International Federation of Automatic Control ([IFAC](#)). Society co-sponsors of the ACC are the American Institute of Aeronautics and Astronautics ([AIAA](#)), American Institute of Chemical Engineers ([AIChE](#)), American Society of Civil Engineers ([ASCE](#)), American Society of Mechanical Engineers ([ASME](#)), IEEE Control Systems Society ([IEEE-CSS](#)), Institute for Operations Research and the Management Sciences Applied Probability Society ([INFORMS-APS](#)), International Society of Automation ([ISA](#)), Society for Modeling & Simulation International ([SCS](#)), and Society for Industrial & Applied Mathematics ([SIAM](#)).

The 2019 ACC technical program will comprise presentations in regular and invited sessions, tutorial sessions, and special sessions along with workshops and exhibits. Submissions are encouraged in all areas of the theory and practice of automatic control.

## KEY DATES

Manuscript Submission: September 17, 2018  
Acceptance/Rejection Notice: January 31, 2019  
Final Manuscript Submission: March 15, 2019

**Call for Contributed Papers:** Papers are invited in the form of regular manuscripts. There is no separate short paper format. Papers must conform to the submission policy, detailed on the conference web page. All manuscripts should be written in English, be in a 2-column format, and be 6–8 pages in length, with additional page charges applicable for pages 7 and 8.

**Call for Invited Sessions:** Invited sessions consist of 6 papers presenting a unifying theme from a diversity of viewpoints. Proposals must clearly describe the motivation and relevance of the session. Proposals must be accompanied by full versions of each paper, which will be individually reviewed together with the proposal itself.

**Call for Tutorial Sessions:** Tutorial sessions are a special category of invited sessions organized to provide an introduction to a topic of interest. The format is structured around the main tutorial paper (up to 12 pages) and talk (60 minutes) to bring the participants up to speed, followed by three 20-minute presentations (with or without papers of up to 6 pages each) to give a picture of the state of the art. Tutorial sessions involving strong industry and academic collaboration are highly encouraged.

**Call for Special Sessions:** Special sessions are focused events to spotlight emerging research areas, funding opportunities, and other topics of broad interest to the conference attendees. Examples include industry-led, research sponsor-led, education-themed, and history sessions.

**Call for Workshops:** Workshops to be held prior to the conference are solicited on all related topics. Proposals for workshops addressing novel control methodologies and nonstandard control applications, as well as workshops with strong tutorial value are encouraged.

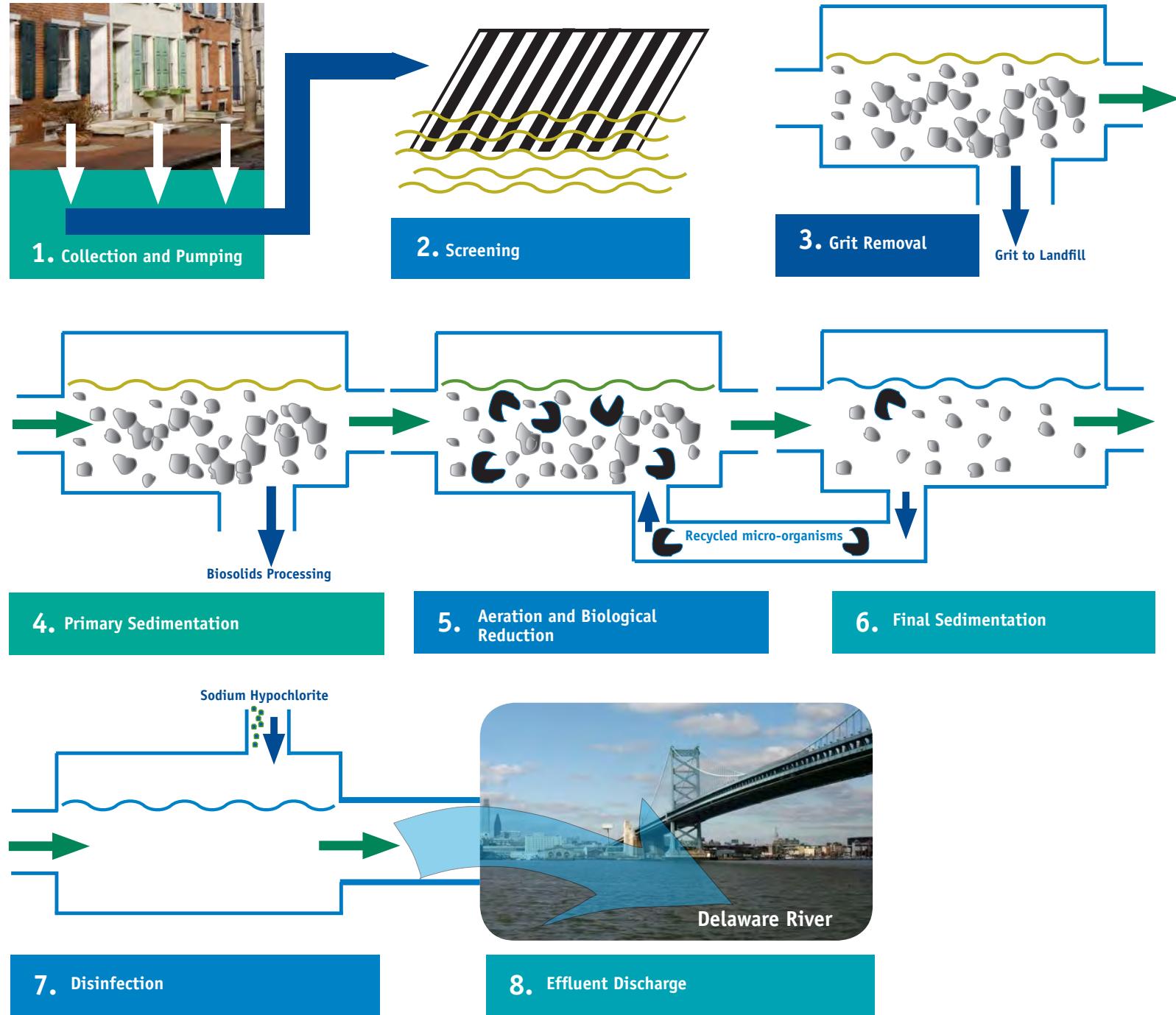
**Exhibits:** Exhibitors are invited to showcase, demonstrate and market control-related publications, software tools, prototypes, educational products, services, and jobs. Exhibits are open throughout the conference to all attendees of the ACC.

Papers and session and workshop proposals must be submitted through the submission website. Submissions must conform to policies given on the conference website: <http://acc2019.a2c2.org/>



Looking forward to seeing you in Philadelphia

# Wastewater Treatment



# MICROORGANISMS IN ACTIVATED SLUDGE

SHARE ON:

DAN THEOBALD JUNE 23, 2014

In the activated sludge process, microorganisms are mixed with wastewater. The microorganisms come in contact with the biodegradable materials in the wastewater and consume them as food. In addition, the bacteria develop a sticky layer of slime around the cell wall that enables them to clump together to form bio-solids or sludge that is then separated from the liquid phase. The successful removal of wastes from the water depends on how efficiently the bacteria consume the organic material and on the ability of the bacteria to stick together, form floc, and settle out of the bulk fluid. The flocculation (clumping) characteristics of the microorganisms inactivated sludge enable them to amass to form solid masses large enough to settle to the bottom of the settling basin. As the flocculation characteristics of the sludge improves, so is the improved settling and improved wastewater treatment.

After the aeration basin, the mixture of microorganisms and wastewater (mixed liquor) flows into a settling basin or clarifier where the sludge is allowed to settle. Some of the sludge volume is continuously recirculated from the clarifier, as Returned Activated Sludge (RAS), back to the aeration basin to ensure adequate amounts of microorganisms are maintained in the aeration tank. The microorganisms are again mixed with incoming wastewater where they are reactivated to consume organic nutrients. Then the process starts again.

The activated sludge process, under proper conditions, is very efficient. It removes 85 to 95 percent of the solids and reduces the biochemical oxygen demand (BOD) about the same amount. The efficiency of this system depends on many factors, including wastewater climate and characteristics. Toxic wastes that enter the treatment system can disrupt the biological activity. Wastes heavy in soaps or detergents can cause excessive frothing and thereby create aesthetic or nuisance problems. In areas where industrial and sanitary wastes are combined, industrial wastewater must often be pretreated to remove the toxic chemical components before it is discharged into the activated sludge treatment process. Nevertheless, microbiological treatment of wastewater is by far the most natural and effective process for removing wastes from water.

There are five major groups of microorganisms generally found in the aeration basin of the activated sludge process:

- 1. Bacteria**-Aerobic bacteria remove organic nutrients
- 2. Protozoa**-Remove & digests dispersed bacteria and suspended particles
- 3. Metazoa**-Dominant longer age systems including lagoons
- 4. Filamentous bacteria**-bulking sludge (poor settling & turbid effluent)
- 5. Algae and fungi**-Fungi is present with pH changes & older sludge

**1. Bacteria** are primarily responsible for removing organic nutrients from the wastewater.

**2. Protozoa** play a critical role in the treatment process by removing and digesting free swimming dispersed bacteria and other suspended particles. This improves the clarity of the wastewater effluent. Like bacteria, some protozoa need oxygen, some require very little oxygen, and a few can survive without oxygen.

The types of protozoa present give us some indication of treatment system performance which are classified as follows:

1. **Amoebae**-Little effect on treatment & die off as amount of food decreases
2. **Flagellates**-Feed primarily on soluble organic nutrients
3. **Ciliates**-Clarify water by removing suspended bacteria
4. **Ciliates**; Free-swimming-Removes free-dispersed bacteria
5. **Ciliates**; Crawling (grazing)-Dominant activated sludge/good treatment
6. **Ciliates**; Stalked (sessile)-Dominates at process end

Protozoa images are below:

**3. Metazoa** are multi-cellular organisms which are larger than most protozoa and have very little to do with the removal of organic material from the wastewater. Although they do eat bacteria, they also feed on algae and protozoa. A dominance of metazoa is usually found in longer age systems; namely, lagoon treatment systems. Although their contribution in the activated sludge treatment system is small, their presence does indicate treatment system conditions.

Three most common metazoa found in the activated sludge treatment system.

1. **Rotifers**-Clarify effluent & are first affected by toxic loads
2. **Nematodes**-Feed on bacteria, fungi, small protozoa & other nematodes
3. **Tardigrades** (water bear)-Survive environmental extremes & toxic sensitivity

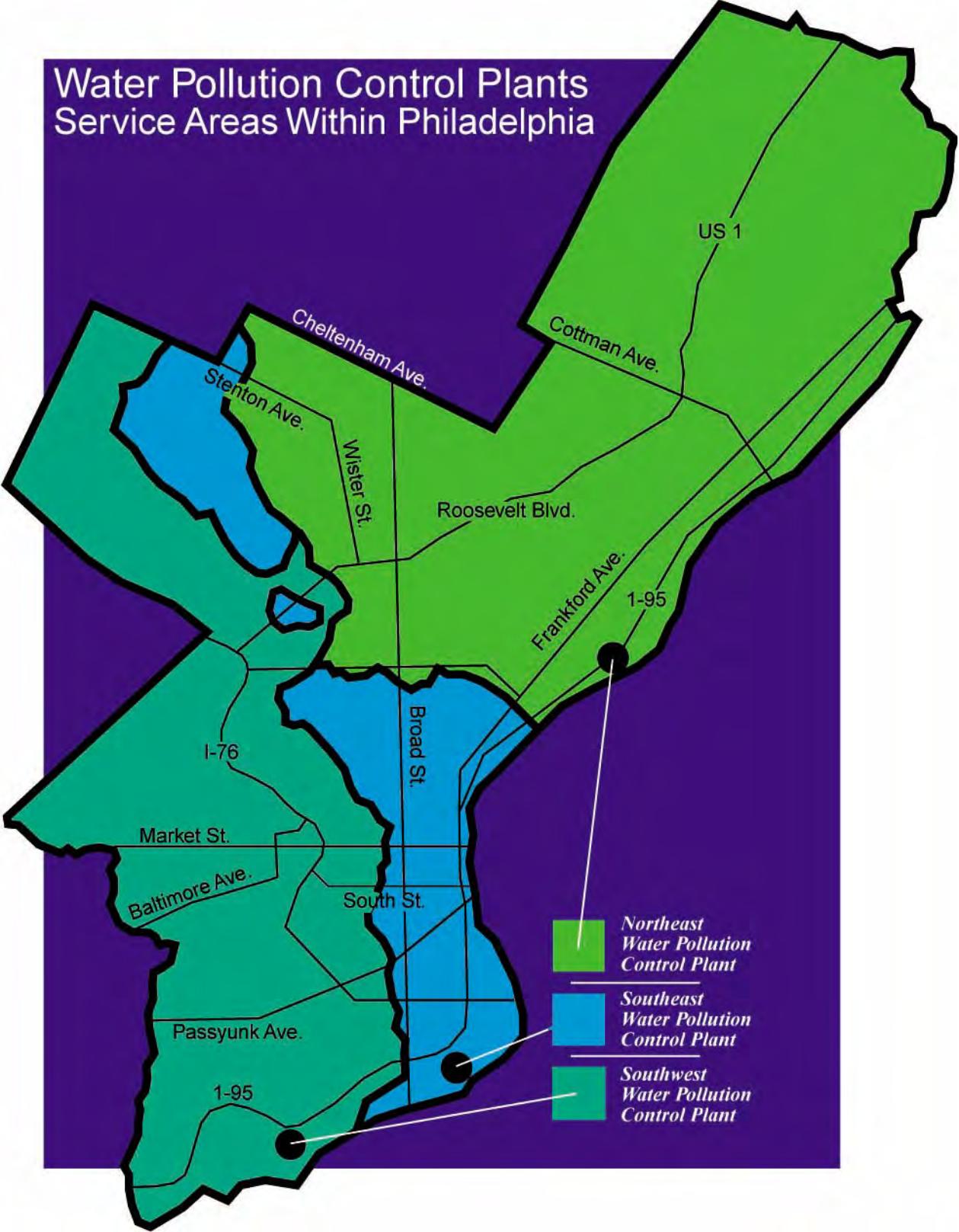
Metazoa images are below:

**4. Filamentous bacteria** are present when operational conditions drastically change. These bacteria grow in long filaments begin to gain an advantage. Changes in temperature, pH, DO, sludge age, or even the amounts of available nutrients such as nitrogen, phosphorus, oils & grease can affect these bacteria. The dominance of filamentous bacteria in the activated sludge treatment system can cause problems with sludge settling. At times excessive numbers of filamentous microorganisms interfere with floc settling and the sludge becomes bulky. This bulking sludge settles poorly and leaves behind a turbid effluent. Some filamentous microorganisms may cause foaming in the aeration basin and clarifiers.

Filamentous images are below:

**5. Algae and fungi** which are photosynthetic organisms and generally do not cause problems in activated sludge treatment systems, however their presence in the treatment system usually indicate problems associated with pH changes and older sludge.

# Water Pollution Control Plants Service Areas Within Philadelphia



# Philadelphia Regional Service Area



# **Directions to the SE Sewage Treatment Plant**

**25 Pattison Avenue  
Philadelphia, PA 19148**

## **From I-95 South**

Take exit **19** for **I-76 E** toward **Walt Whitman Bridge/Packer Ave**,  
(staying **RIGHT**)

Keep right at every choice in the curve, follow signs for **I-76 W/Packer Ave**  
and turn right onto **S Front St**

Drive 0.9 mi, and dead end at Pattison Ave.

## **Turn left at Pattison Ave**

Go Under the bridge and across railroad tracks and take the second turn left  
into the fenced and labeled Southeast Waste Water Treatment Plant, just  
before the road divide barrier starts.

Other directions:

**From Schuylkill Expressway**, exit at Pattison Ave, and drive East. Pass  
Front Street, go under I-95 bridge, across railroad tracks and take the second  
turn left into the fenced Southeast Waste Water Treatment Plant, just before  
the road divide barrier starts.

Public Transportation- not easy. You can take Broad Street Line to Pattison  
Ave (like going to the sports stadium). Walk East on Pattison Ave, and  
follow the directions above: Pass Front Street, go under I-95 bridge, across  
railroad tracks and almost immediately turn left into the fenced Southeast  
Waste Water Treatment Plant, just before the road divide barrier starts. This  
is a 16 block walk.

**From Columbus Boulevard**, Drive South on Columbus Boulevard. It  
changes to Pattison Ave. The Southeast Sewage Treatment Plant is on your  
right, 25 E Pattison Ave.



### **GENERAL RELEASE, WAIVER & INDEMNIFICATION**

Name: \_\_\_\_\_

(Please Print)

Address: \_\_\_\_\_

\_\_\_\_\_

I, the undersigned, in consideration of permission granted to visit and/or enter on or into City of Philadelphia property, located at the \_\_\_\_\_ Water Treatment Plant (**the "Property"**), hereby agree for and on behalf of myself, my personal representative, executors, administrators, heirs and assigns, to release, waive or forever discharge **The City of Philadelphia (the "City")**, its employees, officers, agents, contractors and representatives from any and all manner of claims, actions or causes of action, suits, demands whatsoever, in law or in equity, which I may have against the City, its employees, officers, agents, contractors and representatives in and/or on the Property, or in any way connected to or arising from my presence to visit and/or tour activities at the Property.

The undersigned, being duly aware of the potential risks and hazards inherent upon visiting or entering on or into the Property, hereby elects voluntarily to visit and/or enter on or into the Property knowing that the condition of the Property may be hazardous. The undersigned hereby voluntarily assumes all risks of loss, damage or injury, including death, that may be sustained while in, on, or about the Property whether said injury or damage may be due to the act, omission or negligence of the City, its representatives, or its respective employees, officers, agents, contractors or otherwise.

I further acknowledge and agree that I will indemnify, defend and hold harmless the City and all related persons and entities described in the preceding paragraph against any claims, acts or proceedings based upon or related to my entrance, presence or activities. No photographs, taping or filming upon or in the Property will occur except where authorized.

I will leave the Property upon the completion of my activities or upon the demand of the City, whichever is sooner.

IN WITNESS WHEREOF, I HAVE SET MY HAND HEREUNTO THIS RELEASE, this

\_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_.

\_\_\_\_\_ (Witness)

\_\_\_\_\_ (Authorized Representative)

Visitor-Release\_2004