



**American Institute of Chemical Engineers,
Cleveland Section**



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Sunday, May 26, 2024, 12:00 PM

AIChE Membership Not Required to attend any meetings.



Greater Cleveland Aquarium (2000 Sycamore Street, Cleveland, OH 44113)

Our Mission: We energize curiosity about aquatic life and the environment to inspire positive action.

<https://www.greaterclevelandaquarium.com/plan-your-visit/what-you-need-to-know/#hours>

You'll feel the industrious vibe instantly as you encounter our first saltwater gallery where fish from exotic regions like Indonesia, Fiji and Hawaii hang out. The king of the jungle here is the venomous lionfish; its red and white zebra-like stripes and long pectoral fins stand as its own personal warning system.

Check out the cleaner shrimp for a quick, "mini-manicure" . . . Aquarium-style. And don't miss the "silver screen" a.k.a. our school of lookdown fish that shimmer and shine as they glide by in a giant wave of cuteness. Add seahorses, jellyfish and live coral and it's quite possible you will never want to leave.

This cold water arch habitat features some of the unique creatures that can survive in that frigid water. The coolest of them all is the giant Pacific octopus – one of the most intelligent and active aquatic animals you will ever encounter.

Big sharks with lots of teeth. What else do you need to know? With 230,000 gallons of water, this impressive space features 3 species of sharks, stingrays, eels and many other species of fish. Walk through the 175-foot underwater seatube and you'll feel like you are SCUBA diving without all the heavy equipment.

Did you know that garden eels spend most of their lives sheltering in place?

That a stingray's skeleton is made of cartilage?

That snowflake eels have a second set of jaws in their throats?

That some sharks lose as many as 30,000 teeth in their lifetimes?

Get a closer look at these and 2,700 other intriguing aquatic animals at Greater Cleveland Aquarium. Travel the globe through 7 immersive galleries that include an 11,000-gallon stingray touch pool and an 175-foot sea tube.

Greater Cleveland Aquarium is nestled in the historic FirstEnergy Powerhouse on the banks of the Cuyahoga River. The building originally was constructed in 1892 to provide electricity to Cleveland's streetcars and railways. Architect John N. Richardson designed the brick powerhouse in the Romanesque revival style and the National Historic Landmark is still known for its stylish arched windows. As the automobile's popularity grew, the need for the powerhouse waned and the building closed its doors in 1920.

In the 1990s and 2000s, the structure was revitalized, playing home to comedy clubs, restaurants and even a few retailers. A large portion of its space was again reimagined when New Zealand-based Marinescape NZ Ltd. chose Cleveland as its first North American project. Greater Cleveland Aquarium opened to the public in 2012 and distressed brick walls, exposed ductwork and reimagined coal chutes and chimneys juxtapose Northeast Ohio industrial history with the Aquarium's conservation message.



During Your Visit

- Purchasing advance tickets online is encouraged. You can show your ticket on your phone, a printout is not required.
- Your ticket is marked with an entry time. This does not limit your visit time, it just indicates your arrival and spreads guests out over the day.
- We are offering adult and child tickets. Children under the age of 2 are free. No additional general admission discounts can be accommodated at this time.
- Greater Cleveland Aquarium has a no refund policy. Reservations may be rescheduled.
- Passholders do not need to make advance reservations for general admission, but advance ticketing for special events and virtual programs is still required for members.
- A limited number of wheelchairs can be borrowed daily. We recommend calling to reserve one on the date of your visit.
- The Aquarium welcomes handlers with trained service dogs in accordance with the Americans with Disabilities Act (ADA).
Only working service dogs that meet ADA standards are allowed inside the Aquarium. Under the ADA a service dog “has been individually trained to work or perform tasks for assisting a person with a disability.”
- Outdoor tables are available first-come, first served for picnicking.
- Propark Mobility operates a large, **credit card-only** parking lot directly in front of the Powerhouse. Take a ticket when you enter and pay on exit (usually \$3-6 per car).

Emperor Angelfish Sign Up for eNews Online Gift Shop



1/3 Promocanthus imperator - All hail the king!
Juveniles are bluish black with concentric white circles but their appearance changes dramatically as they mature.

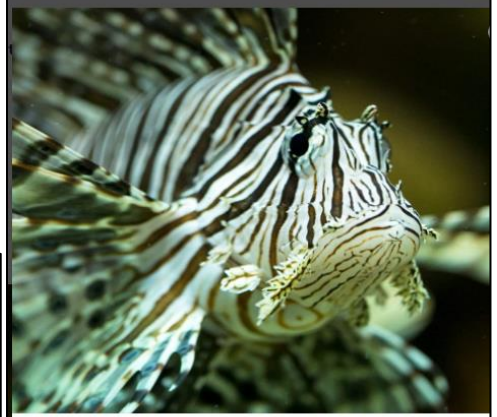


Giant Pacific Octopus Sign Up for eNews Online Gift Shop



Enteroctopus dofleini - Doesn't he know you from somewhere? Smart enough to recognize human faces and solve puzzles. Each arm is covered in about 250 suckers that allow them to taste and smell.

Lionfish Sign Up for eNews Online Gift Shop



1/3 Pterois volitans - Member of the clean plate club. Voracious eaters that can consume up to 30 times their stomach volume. Venomous dorsal spines deliver a very painful sting that can last for days.

Meeting Location:

2000 Sycamore Street
Cleveland, OH 44113
216-862-8803, X-7700

Greater Cleveland Aquarium

12:00 – 1:00 pm: Free Picnic Tailgate Party
1:00 – 5:00 pm: Aquarium Tour
2:00 – 3:00 pm: Shark Feeding Time?

Aquarium Ticket Purchase Online: \$19.95 Admission per Adult (13+years); **\$13.95** per Child (2-12 years)

<https://secure.greaterclevelandaquarium.com/#>
<https://secure.greaterclevelandaquarium.com/#/Admission>

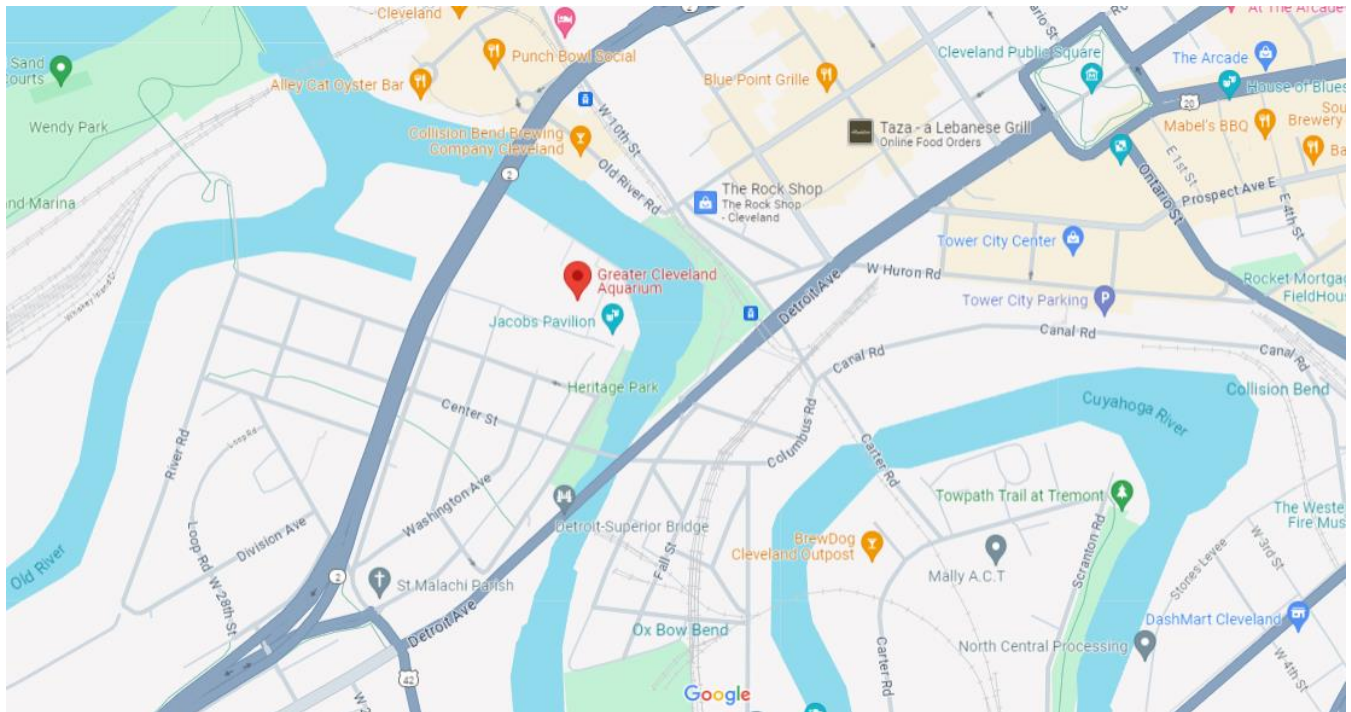
Parking: Pickup parking ticket on entry, pay for parking on exit, usually **\$3 to \$6**

Picnic Menu (Free):

Hamburgers, buns, lettuce, tomato, pickles, onions, cheese
Hot dogs, buns, cheese
Bratwurst, buns, peppers, sauerkraut, cheese
Potatoe Salad, Cole Slaw, Baked Beans
Beverages: Iced Tea, Coke, Pepsi, 7-Up, Root Beer, Water
Mustard, ketchup, pickle relish, & chopped onions



RSVP Please for Picnic Food Prep with Joseph Yurko and AIChE at: yurkojoe5@gmail.com



Location Map of Greater Cleveland Aquarium



History and Heritage Banquet 2024

The Cleveland Section of ASME (American Society of Mechanical Engineers) invites you to the 2024 History and Heritage Banquet to be held on May 15, 2024, at:

Flat Iron Cafe
1114 Center St, Cleveland, OH 44113

Doors open at 6:00 PM

AGENDA

6:00 PM	NEOSEF Winner Demonstrations & Networking
6:30 PM	Dinner
7:00 PM	Presentation of Awards Garret Morgan Scholarships & NEOSEF Winners
7:15 PM	Keynote Presentation Dr. Joseph Connolly, NASA Glenn Research Center Topic: NASA Sustainable Aviation Technology Development
8:15 PM	Vote of Thanks

RSVP by May 8 to Matt, (216) 513-7297, clevelandasme@gmail.com, to reserve your seat.

Members – \$15; Non-Members – \$20; Students – \$10



**Keynote Topic: NASA Sustainable Aviation
Technology Development by Dr. Joseph Connolly,
NASA Glenn Research Center**



NASA's research in Electrified Aircraft Propulsion (EAP) offers new possibilities for reducing fuel and energy usage in aviation. Innovative technologies, aircraft concepts, test aircraft, and ground test facilities will turn this vision of efficient flight from science fiction to reality. The single aisle segment of the aviation market provides the largest opportunity to impact emission reduction goals of the United States to be net zero by 2050. This presentation will highlight ongoing technology development across the Aeronautics Research Mission Directorate projects to mature critical technologies for the single aisle market.

American Institute of Architects (AIA) Open Boat Cruise on the Goodtime III, May 31st with a meal for \$25!

I am reaching out today to gauge your interest in partnering with AIA Cleveland for our annual Boat Cruise on the Goodtime III. Many of you partner with us annually so this is just checking to make sure you are aware and interested in attending our event.

Due to limited availability of the boat, our cruise date is already pre-selected for Friday, May 31st. Tickets again would be \$25 and include pizza on board the boat. Each ORG can market the event however you would like.

Please let me know if you are still interested and I will follow up with more details. Thanks!



adam yaracs AIA, NCARB, LEED AP, project manager, ayaracs@ikminc.com

ikm architecture, 1001 Huron Road East, Suite 102, cleveland, oh 44115, main: 216-678-9456, direct: 878-999-2284 , www.ikminc.com

For the CLE AIChE part in the AIA Boat Cruise, we are not planning a formal meeting event and you are open to attend this event at your leisure.



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- Design
- Construction and Estimating
- Project Managers
- Machinery



THE FUTURE OF TRAVEL

Need to get to the airport? Soon you can take an air taxi.

Besides the move to electric engines, airlines are investigating options for fuel such as hydrogen and repurposed fuels.

Edward Russell *Washington Post*

Last November, a small, white, oblong helicopter with four passenger seats and six whirring electric engines took off from the Downtown Manhattan Heliport.

Several people, including Mayor Eric Adams, watched as the air taxi known as an eVTOL — an electric vertical takeoff and landing aircraft — flew silently along the East River.

“To bring electric flight and the benefits of electric flight here is a dream come true,” said Joe Ben Bevirt, the CEO of Joby Aviation, to the crowd. Joby is just one of dozens of firms around the world betting on eVTOLs. Their backers include some of aviation’s biggest names, such as Delta Air Lines, United Airlines and Embraer.

Many airlines and aviation companies are experimenting with new technologies not only to manage relentless economic pressure to be an affordable choice for transportation but also to be more environmentally friendly. Besides the move to electric engines, airlines are investigating options for fuel such as hydrogen and repurposed fuels. Investors have spent an estimated \$22.2 billion, according to



Beta Technologies' Alia aircraft flies near the Statue of Liberty. *Brian Jenkins, Beta Technologies*



A rendering of Heart Aerospace's new 30-seat electric turboprop plane, the ES-30. *Heart Aerospace*



Universal Hydrogen's 40-seat plane flies over the Mojave Desert. The company aims for certification in 2026. *Universal Hydrogen*

an estimated \$2.2 billion, according to a report published by the McKinsey Center for Future Mobility. Most companies aim to fly their new offerings in noticeable numbers by the end of this decade - or relegate them to the trash heap of history while they pursue other options.

"You need to have a similar revolution as (with) the electric car," said Anders Forslund, co-founder and CEO of the Swedish company Heart Aerospace.

SHORTER ROUTES

Modern airplanes are more efficient and safer than they were when the 707, Boeing's first jetliner, debuted in 1958. Boeing's latest long-range model, the 787, looks similar even if the engineering is much improved.

"This is an industry based upon remarkable, sustained, incremental progress," said Richard Aboulafia, a managing director at AeroDynamic Advisory, in explaining the glacial pace of change in design.

Heart Aerospace intends to change that reputation. Engineers are developing a 30-seat electric turboprop plane, the ES-30, with backing from the likes of Air Canada, Saab and United. The plan is to be operational by 2028. While the ES-30 looks like the prop planes that already fly passengers to small towns around the world, it could be revolutionary if certified: It does not emit carbon while it flies, and it is quiet. The lower cost of operating the ES-30 could also help airlines reopen

routes where flights disappeared years ago.

Electric planes have their disadvantages, too. Battery capacity, despite recent improvements, does not equal the energy density of jet fuel. Installing a larger battery would add significant weight to a plane. To compensate, the planes would have to reduce the number of passenger seats to roughly 40 to 50. Last year, domestic flights averaged 132 seats per flight, according to the aviation data analytics firm Cirium Dilo.

Flying range would also be limited. An electric plane must fly within a few hundred miles; the average distance flown today is 770 miles.

"In 2030, we're not going to be able to cover all the (airline) routes, but we're going to be able to cover the routes up to 500 miles with reserves," said Kyle Clark, co-founder and CEO of Beta Technologies.

"We've already seen (batteries) doubling in energy density," Clark said. The company first flew an electric test plane in 2017, proving that battery-powered planes can fly. Certification of its production model, the Alia, is underway.

The debate around eVTOLs is different. Delta Air Lines, in partnership with Joby, plans to offer a "premium Home to Seat" service to connect heliports with nearby major airports once certified by the Federal Aviation Administration.

The firms estimate about 1,000 people a

day would choose eVTOLs instead of automobiles to travel to and from the airport. This number is equivalent to just 2% of the roughly 18.2 million travelers the airline managed at New York's John F. Kennedy International Airport during the year ending in November, based on Bureau of Transportation Statistics data.

"Moving around people with more means to access mobility and, in some cases, bypass congestion raises equity concerns," said Adam Cohen, a senior researcher looking at transportation issues at the University of California at Berkeley.

Helicopter flights between Manhattan and JFK and Newark airports cost nearly \$200 per person on Blade. Fares for Home to Seat haven't been disclosed.

"From an engineering and technical perspective we can design these (options)," Cohen said. "It comes down to ... how do we leverage it to maximize public good."

The first commercial eVTOL flights could be in operation this summer at the 2024 Olympic Games in Paris. Certification delays, however, might nix that dream. And, maybe as soon as 2025, Joby and Delta hope to launch flights in New York and Los Angeles; United and Archer Aviation plan to do the same in Chicago.

HYDROGEN AS AN AVIATION FUEL

Hydrogen, depending how it is sourced and produced, can be free of carbon emis-

sions. It also weighs less than most electric batteries, allowing the plane to store more energy for longer flights. The downside for using liquid hydrogen is space: The fuel requires more space to carry the amount needed to power most commercial aircraft, which means less space for paying passengers.

"Hydrogen has always been the holy grail of aviation fuels," said Paul Eremenko, co-founder and CEO of Universal Hydrogen. Hydrogen is light and can power a fuel cell that generates electricity. The company, backed by American Airlines, JetBlue Ventures and others, is developing a hydrogen fuel-cell system that could be retrofitted on existing prop planes.

Universal Hydrogen began testing its fuel cells on a 40-seat plane last year in Moses Lake, Washington. Flight tests have since moved to Mojave, California, with an aim to earn certification in 2026.

European aerospace giant Airbus is considering hydrogen fuel as well for its planes. In 2020, Airbus engineers began developing a hydrogen-powered aircraft known as ZEROe with a plan to be operational by the middle of the 2030s. Air New Zealand is betting on all of the new technologies, from electric to hydrogen, for its future fleet. The company is partnering with Heart Aerospace and Universal Hydrogen, among others.

RECOGNIZED AS A

TOP WORKPLACE IN NORTHEAST OHIO



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PLACES
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This rendering shows astronauts in training using a deep pool. Blue Abyss plans to build this kind of facility in Brook Park. *Blue Abyss/Bloc Digital*

SPACE EXPLORATION

Brook Park. Launching pad to the final frontier?

In the near future, in a suburb not far, far away ... The next space race needs astronauts, and a new \$250 million facility near Hopkins will train them.

Sean McDonnell smcdonnell@cleveland.com

The world has entered a new kind of space race in which companies, instead of countries, are competing to reach new heights. And the next generation of astronauts might be trained in a Cleveland suburb.

A British company called Blue Abyss has plans to build a \$250 million facility on land it bought in Brook Park along Aerospace Parkway. Plans include a 164-foot-deep pool, a centrifuge to mimic rocket takeoffs and a plane capable of creating weightlessness.

It's designed to train people and test vehicles for two frontiers — space and the deep sea. And it comes at a pivotal time, because space is quickly going from a place only governments visit to a place

where businesses are built.

"The commercialization of space is clearly well under way," said Marc Drew, chief operations officer for Blue Abyss.

Companies such as Elon Musk's SpaceX have made getting into orbit much cheaper. A new industry is taking root and it will need a new workforce of astronauts that work for private companies.

You don't have to look far for this new industry, with companies like Middleburgh Heights-based ZIN Technologies helping to develop a private space station and Cleveland's Redhouse Studios working on potential mushroom-based space housing.

Blue Abyss was founded in 2014 to meet the demand in both the space and deep-sea markets.

The company is continuing to raise financing for the project, and plans to start work at the site late this year. Blue Abyss' plan is to open in 2026.

Brook Park sold Blue Abyss 12.8 acres for more than \$780,000 in January. Cuyahoga County Council recently approved a \$450,000 grant for the site, and the city approved a 15-year tax abatement.

Drew said the facility would employ about 200 people once opened, which includes 135 at the training facility and another 65 in an attached hotel.

The training that's available for commercial astronauts today is piecemeal and is done at places across the country. At Blue Abyss the vast majority of training that's needed would be under one roof.

"There's no company that can say 'We can provide everything that's required to train someone for space,'" said Simon Evetts, Blue Abyss' research and development director.

"That's where we are different," he said. "That's where we intend to be first to market with the ability to provide everything that's needed."

SEE SPACE EXPLORATION, A4

SPACE EXPLORATION

Brook Park. Launching pad to the final frontier?

Continues from A1

A UNIQUE FACILITY

Blue Abyss' facility in Brook Park would be about 300,000 square feet, and it would have a host of facilities and machines meant to simulate the extreme environments trainees will face.

There isn't another facility like it, except for another training facility that Blue Abyss is in the process of building in Coenwall, England.

Plans include a large crane that can lift a deep-sea vehicle or a mock-up space station in and out of the training pool. It would have both hyperbaric and hypobaric chambers that could simulate the air pressure found deep under water or in space.

The facility will have a planetarium and a hotel, because with how expensive this kind of training is, it makes sense to use Blue Abyss' facility as much as possible, Drew explained.

Three of the facility's mainstays are to be the training pool, the centrifuge and the parabolic plane.

Blue Abyss' pool will be about 164 feet long and 131 feet wide. The deepest shaft of the pool will be about 164 feet deep. That part of the water is meant for submersibles. The pool will have multiple sections at varying depths.

The Astrolab, meant for space training and experiments, will be on a 65-foot wide shelf that runs the length of the pool, and will be about 40 feet deep.

The pool will have lots of different capabilities and services, Everts said. But for space, water is used because it simulates neutral buoyancy — a state where an item isn't rising or falling from gravity.

Astronauts could get fully submerged in water — along with trained divers — and use this pool to practice what it would feel like to walk or move in space.

The same would be true for a mock up of a space station, which could be tested by being lowered into the pool to experience the same neutral buoyancy.



Blue Abyss plans on building a new facility in Brook Park that can be used for both the space and deep sea industries. This rendering shows the design for the outside of the facility, which will be adjacent to Cleveland Hopkins International Airport. Blue Abyss/Level Two

The deeper parts of the pool would be used for the deep-sea industry. Deep-sea divers could use it for training. Or a company could test an smaller autonomous, submersible vehicle to see how it maneuvers.

The pool would also have the ability generate currents, further simulating the ocean.

Blue Abyss' plans include a centrifuge, essentially a mock cockpit that's attached to a long arm that spins. The centrifuge could accelerate fast enough to simulate the forces astronauts would feel during a takeoff.

Astronauts in the centrifuge could learn what a takeoff feels like, but they could

also learn how to move and operate controls while undergoing that kind of force, Everts said. The centrifuge would also have augmented reality features to help simulate the experience.

The parabolic plane is more of a facility in the sky, but it is also a big part of Blue Abyss' training. These planes fly in a parabola, a symmetrical curved shape, and do so in a way that simulates zero gravity.

Essentially, the plane flies up and then starts to freefall. This creates a situation where the acceleration of the plane and the acceleration of gravity cancel each other out — giving passengers around 20 to 40

seconds of weightlessness.

This kind of plane can be used to train astronauts. One was also used to make a music video for the band OK Go's "Upside Down & Inside Out." If you want to see a video of how this works.

A WIDE RANGE OF ASTRONAUTS

What makes someone an astronaut is a debate itself — the Federal Aviation Administration actually changed these rules recently — but Everts said commercialization means a wider range of people will travel to space, and each person needs a different kind of training.

SEE BROOK PARK, A*

BROOK PARK

Next space race needs astronauts, and a new \$250 million facility will train them

Continues from A4

On one end of the spectrum is a traditional government-trained astronaut, like those in NASA or the European Space Agency. Training them is an expensive endeavor, so they get years of training and make being an astronaut a career.

These kinds of astronauts will still exist in the private and public sector, and Blue Abyss plans on training them.

But some astronauts may need less training.

A space-flight participant, a nice-term for space tourist, may take a suborbital flight where they touch space but don't go into orbit around the Earth. Training for that may take a few weeks.

A scientist or researcher going into orbit for a month, along with an experiment, would need several months to train, Fwerts said.

And career astronauts would still need years of training.

LOCAL IMPACT

Drew explained that Blue Abyss' facility will be multi-faceted. Universities may partner with Blue Abyss for experiments. Hospitals may use it to research things like osteoporosis, a condition many astronauts deal with that causes bone density to decrease, to see if those treatments can be applied to more patients.

Research and development for different space and deep-sea businesses could be done at the Blue Abyss facility. There would also be opportunities for the public to do some space tourism, like visiting the planetarium or using the parabolic plane.

The facility, once built, won't just be unique to Ohio, but unique globally, Drew said.

Brook Park Mayor Ed Orcutt said Blue Abyss is an exciting addition to Brook Park, both because of the jobs it will add and because of what the facility will do for both the space and deep-sea industries.

"We think it's something that matches what we've been doing in Brook Park for



Blue Abyss' Brook Park facility will be on Aerospace Parkway, adjacent to Cleveland Hopkins International Airport. Blue Abyss

decades," Orcutt said, adding that they've been leveraging the proximity to the NASA Glenn Research Center to attract more companies to the city.

He and Paul Marnecheck, Brook Park's commissioner of economic development, said Blue Abyss could be "a catalyst" that brings other businesses to the area, since they can be near Blue Abyss and the NASA Glenn Research Center.

Marnecheck said the city is already getting inquiries from other companies, wanting to know what land is available

and how it is zoned.

Brook Park owns another five acres next to Blue Abyss' future facility and another plot near the intersection of Cedar Point Road. Private owners also own developable land nearby.

Events of Blue Abyss, called Ohio "a new center of gravity of space," whether it's private space companies or research being done at places like Ohio State University, he said lots of things are building up to make the state part of the new space economy.

"We think it's something that matches what we've been doing in Brook Park for decades."

Brook Park Mayor Ed Orcutt

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CLE AIChE: Cleveland Chapter Fall 2023 – Spring 2024 Program Planning

_(as of May 2024)

Month	Topic, Speaker	Location	AIChE Officer Responsible
September 8, 2023 (Friday 6 PM)	Oktoberfest Social Event	German Central Farm, Parma	Joe Yurko, \$7/guest admission + \$ food & beverage? https://germancentralfoundation.com/oktoberfest
October 11, 2023 (Wednesday 6 PM)	Brewery Tasting Tour	Market Garden Brewery, OH City	Mike Galoczy, \$20/guest with 20 guests. Dinner: 7 PM Market Garden Brewpub & Restaurant.
October 30, 2023 (Wednesday 5:30PM)	ASM Joint Meeting: H2 effect on heating metals, Justin Dzik, PE	FIVES North American Combustion, Inc.,	Joe Spagnuolo & Joe Yurko: \$30 Non-members, \$15 Retirees, \$5 Students. German Dinner, Presentation, and Tour facility. https://www.fivesgroup.com/energy-combustion
November 14, 2023 (Tuesday 6 PM)	History of ACS 7-National Chemical Landmarks Sites in Cleveland, Helen Mayer Spkr.	The Sanctuary, Rockside Road Independence, 44131	Joe Yurko, Dinner menu ordering for professional members, Students cost: \$5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
December 7, 2023 (Thursday 6 PM)	Nuclear Power an Introduction, Speaking: Andrew Chrabala	The Sanctuary, Rockside Road Independence, 44131	Joe Yurko, Dinner menu ordering for professional members, Students cost: \$5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
January 29, 2024 (Monday 6 PM)	Chemical Process Safety Analysis, Speaking: Gurmukh Bhatia, CPSA	CCPL Independence 6361 Selig Drive Independence, 44131	Joe Yurko, Dinner for professional member's cost: \$10, Students cost: \$5 CCPL Independence Branch: 216-447-0160, Menu: vote on recipe
February 15, 2024 (Thursday 6 PM)	Appalachian Regional Clean H2 Hub ARCH2 DOE Award, Andrew Thomas, JD, CSU	The Sanctuary, Rockside Road Independence, 44131	Joe Yurko, Dinner menu ordering for professional members, Students cost: \$5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
March 11, 2024 (Monday 6 PM)	Safety Engineering in Oil Refining processes; Marianne Corrao Speaking	The Sanctuary, Rockside Road Independence, 44131	Mike Galoczy, Dinner menu ordering for professional members, Students cost: \$5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
March 13, 20 & 27 Wednesday 6-8 pm *CANCELLED*	Chemical Process Safety Analysis Seminars; Gurmukh Bhatia, CPSA	Cleveland Analytical LLC 15666 Snow Road Brook Park, OH	Joe Yurko, Dinner cost is included in the seminar expense. Seminar expense: TBA at a later time. Certificates will be awarded for each class as well as a final certificate.
April 4, 2024 Thursday 5-8 pm	NEOSEF Awards Banquet Rosanne Brunello-McCay NASA Solar System Amba.	CCPL Parma Snow Road Branch 2121 Snow Road	Joe Spagnuolo, Moderator NEOSEF Students, CCPL Snow Road Branch, Parma 44134, \$10 members, \$5 students, NEOSEF students free. Dinner: Beef Stew & Chicken Stew
May 26, 2024 Sunday 12-4 pm	Greater Cleveland Aquarium Tour	Cleveland Aquarium 2000 Sycamore Street Cleveland, Ohio 44113	Joe Yurko, Dinner cost is FREE for picnic hamburgers, hot dogs & brats Greater Cleveland Aquarium. Admission fee: \$19.95 online tickets Parking fee: \$3-6 pay parking ticket on exiting lot.

In person events -- Remote meetings if non-contact required / **COMPLETED MEETING** / **PLANNED MEETING** / **PROPOSED MEETING**

