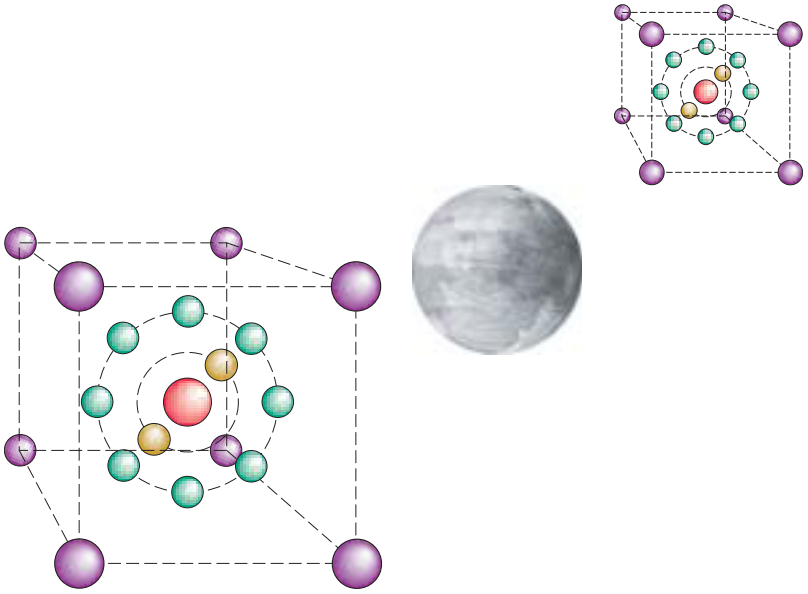

Argon One

An Earth Colony in Orbit Around Europa

Presented by

the Collierville Middle School Space Exploration Club, Collierville, Tennessee

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31 March 2003

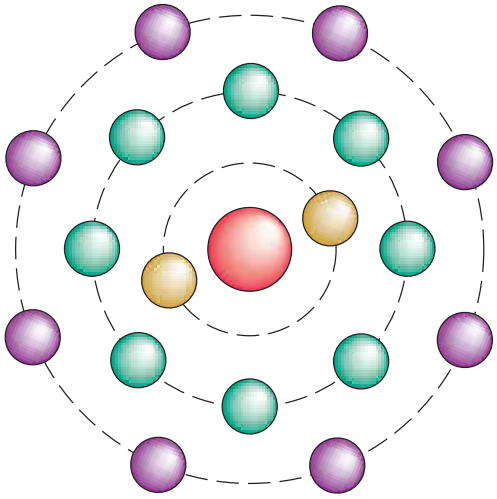
Argon One

Table of contents

01 History of Argon, the element

Atomic Number:	18
Atomic Symbol:	Ar
Atomic Weight:	39.948
Electron Configuration:	[Ne]3s23p6
Melting Point:	83.66 K (-308.82 ℉)
Boiling Point:	87.11 K (-302.6 ℉)
Density:	0.0017837 grams per cubic centimeter
Phase at Room Temperature:	Gas

Atomic structure of the element Argon ---------->

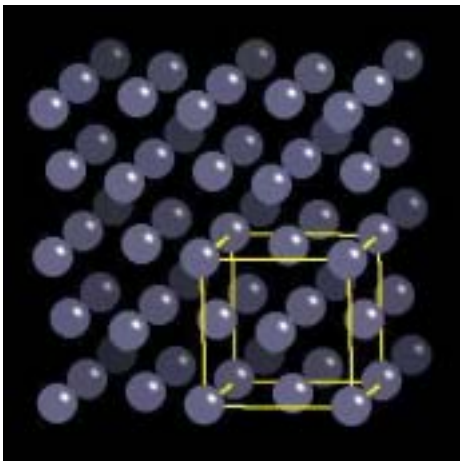


The presence of argon in air was suspected by Cavendish in 1785, and discovered by Sir William Ramsay, a Scottish chemist, and Lord Rayleigh, a British chemist, in 1894. Argon is from the Greek word for inactive, *argos*.

Argon gas is prepared by fractionation of liquid air. The atmosphere contains 0.94% argon, making it the third most abundant gas. The atmosphere of Mars contains 1.6% of 40Ar and 5 p.p.m. of 36Ar. Argon is obtained from the air as a by-product of the production of oxygen and nitrogen.

Argon is two and one half times as soluble in water as nitrogen, having about the same solubility as oxygen. Argon is colorless and odorless, both as a gas and liquid. Argon is considered to be a very inert gas and is not known to form true chemical compounds, as do krypton, xenon, and radon.

The crystal structure of solid Argon
is CCP [cubic close-packed]. ---------->



Naturally occurring argon is a mixture of three isotopes. Twelve other radioactive isotopes are known to exist. Argon is a gas in its natural state. When it is in solid form, the solid crystal structure of Argon is CCP [cubic close-packed].

Argon is frequently used when an inert atmosphere is needed. It is used to fill incandescent and fluorescent light bulbs to prevent oxygen from corroding the hot filament at a pressure of about 400 Pa. It is also used in filling photo tubes, glow tubes, etc. Argon is used as an inert gas shield for arc welding and cutting, as a blanket for the production of titanium and other reactive elements, and as a protective atmosphere for growing silicon and germanium crystals. Argon is used in growing semiconductor crystals and processes that require shielding from other atmospheric gases. It may be used to provide an inert atmosphere for certain projects when explosion or other forms of oxidation may pose a problem. It is also used in "Geiger" counters, which measure radiation levels.

02 History of Argon, the colony

Earth Date::: 31 March 2083 <---------current date on Earth

Argon Date::: 0021:060 <---------current date on Argon [year 21; day 60]

Argon was chosen as the name of our colony because of the element's uses as an inert shield, its uses in many different light sources and its uses in crystal growth. *Argon*, the colony, was destined from the beginning, to be a source of light in our solar system . . . shining brightly through research, development and the continued exploration of space, the final frontier. Like argon the element, *Argon* the colony was destined from the beginning to be a shield, protecting the survival of the species of Earth.

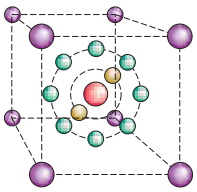
Early in the 21st century Earth entered the New Industrial Revolution. In **2008**, a complete realignment of governments took place under the direction of the former United Nations alliance of countries. The World Alliance was established and all governments of Earth signed a non-aggression treaty, establishing a new world order. With it's headquarters in Geneva, Switzerland, the World Alliance [WA] established regional unions: [1] the North American Union; [2] the South American Union; [3] the European Union; [4] the Mid-Eastern Union; [5] the Western Asia Union; [6] the Eastern Asia Union; and [7] the Oceanic Union. Under this new alignment, hostile and oppressive powers were abolished and world peace became a real and lasting reality in **2012**.

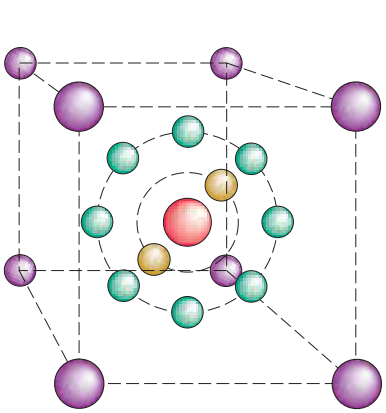
The 7 Union members of the World Alliance established a new technological course and the New Industrial Revolution was born. Research and development combined the efforts of Earth's greatest scientific and engineering minds and robotics quickly developed as the leading edge of manufacturing and distribution. Automated systems took over virtually all production on Earth.

In **2020**, the World Alliance developed and constructed the first Space Elevator, anchored firmly to the ground in Sri Lanka, with the other end based 22,500 miles above the Earth in a geostationary orbit. Initially, a tiny 20cm-wide carbon ribbon was deployed from an altitude of 22,500 miles. Robot climbers constructed the space elevator [called The Ribbon] by crawling up and down the ribbon, adding small ribbons alongside the original one until The Ribbon was wide enough to accommodate payloads as heavy as 20,000 pounds at a time. Power to the robot climbers was beamed up from Earth using free-electron lasers. The Ribbon became the primary means of delivering payloads to space in **2022**.

Using The Ribbon, construction of Argon began in **2025**, in Earth-orbit. Thrusters onboard the first section of Argon propelled The Nucleus into position around Europa in **2030**. Robot workers have been used from the very beginning to accomplish the construction of Argon. For 53 years, robotic construction of Argon has continued. Argon One consists of 19 complete modules [one Nucleus and 18 Electrons]. Argon One is in geostationary orbit above the northern pole of Europa. Construction of Argon Two is underway now in geostationary orbit above the southern pole of Europa. Full-time habitation of Argon One began in 2030 and the population of Argon One has grown from the initial 100 inhabitants in 2030 to over 20,000 inhabitants in 2083. The Nucleus of Argon Two is currently inhabited by a colony of 200 people. Argon Two will continue to grow to a population of 10,000. At that time, construction of Argon Three will begin.

Construction of Argon Two began in 2075 ----------->

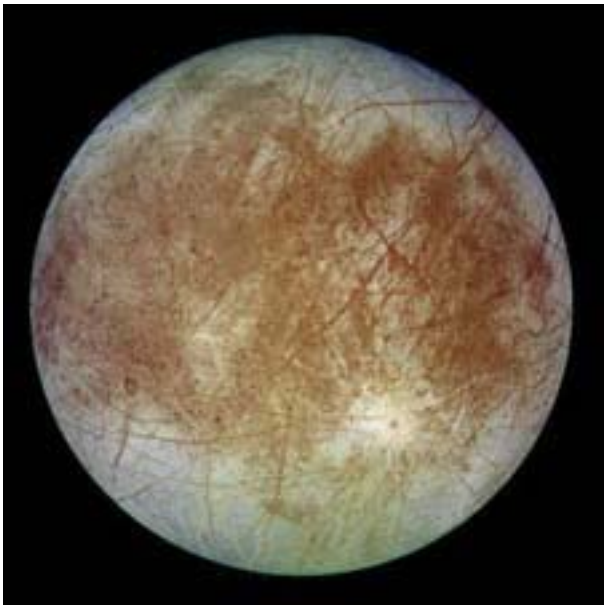




<----------- Construction of Argon One began in 2025

03 Facts about Europa

Discovered By:	Galileo Galilei
Date of Discovery:	1610
Distance from Jupiter:	671,000 km
Radius:	1,565 km
Mass:	4.79982 x 1025 g
Rotational Period:	Synchronous
Orbital Period:	3.551181041 days
Orbit Eccentricity:	0.009
Orbit Inclination:	0.47 degree
Major Atmospheric Constituents:	Oxygen



<----------Europa

Europa [yur-ROH-pah], the second of Jupiter's 40 moons, is a unique moon which has fascinated scientists for hundreds of years. Its surface is among the brightest in the solar system, a consequence of sunlight reflecting off a relatively young icy crust. Its face is also among the smoothest, lacking the heavily cratered appearance characteristic of Callisto and Ganymede, sister moons of Jupiter. Lines and cracks wrap the exterior as if a child had scribbled around it. Europa has a large number of there intersecting features. Europa has almost a complete absence of craters as well as

<---------- The surface of Europa

almost no vertical relief. As one scientist put it, the features “might have been painted on with a felt marker”. Europa may be internally active due to tidal heating at a level one-tenth or less that of Io. Its crust may have, or had in the past, liquid water which can harbor life. Models of Europa's interior show that beneath a thin 5 km (3 miles) crust of water ice, Europa may have oceans as deep as 50 km (30 miles) or more. The visible markings on Europa could be a result of global expansion where the crust could have fractured, filled with water and froze. The search for life on Europa still continues, and water is one key ingredient essential for life.

Sulfuric acid, a corrosive chemical found on Earth in car batteries, exists on the frozen surface of Jupiter’s icy moon Europa. “This demonstrates once again that Europa is a really bizarre place,” said Dr. Robert Carlson of NASA’s Jet Propulsion Laboratory (JPL) in Pasadena, CA. “Sulfuric acid occurs in nature, but it isn’t plentiful. You're not likely to find sulfuric acid on Earth’s beaches, but on Europa, it covers large portions of the surface.”

At first, spectrometer findings of sulfuric acid on Europa discouraged any idea that life might exist there. Even though we know there are acid-loving bacteria on Earth, sulfuric acid is a harsh chemical. Its presence on Europa doesn’t in any way rule out the possibility of life. To make energy, which is essential to life, you need fuel and something with which to burn it. Sulfur and sulfuric acid are known oxidants, or energy sources, for living things on Earth. These findings encourage us to hunt for any possible links between the sulfur oxidants on Europa’s surface, and natural fuels produced from Europa’s hot interior.

Europa is named after the beautiful Phoenician princess who, according to Greek mythology, Zeus saw gathering flowers and immediately fell in love with. Zeus transformed himself into a white bull and carried Europa away to the island of Crete. He then revealed his true identity and Europa

became the first queen of Crete. By Zeus, she mothered Trojan war contemporaries Minos, Rhadamanthus, and Sarpedon. Zeus later recreated the shape of the white bull in the stars which is now known as the constellation Taurus.

The fascination with Europa began centuries ago in 1610 when Galileo Galilei discovered four Jovian satellites: Io, Callisto, Ganymede, and Europa. But only recently have we begun to learn more about the sphere. About forty years ago, modern astronomer Gerard Kuiper and others showed that Europa's crust was composed of water and ice. In the 1970s, space exploration of Jupiter's satellite system began with the Pioneer and Voyager fly-by missions which verified Kuiper’s analysis of Europa and discovered other characteristics. In 1995, the Galileo spacecraft began gathering more detailed images and measurements within the system, providing the information needed to piece together Europa’s past, present, and future.

04 Facts about the Jovian system

<---------- Jupiter

With at least 40 moons and several rings circling it, Jupiter is the largest planet in our solar system. This giant planet is surrounded by an enormous magnetic field called the magnetosphere, which has a million times the volume of Earth's magnetosphere. Its immense, complex atmosphere includes the Great Red Spot, a 300-year-old storm that is almost the size of three Earths.

The hint of liquid water is what drove us toward exploration of Europa, one of Jupiter's four major moons. Four times farther from the heat of the Sun than Earth is, Europa wears a global coat of ice. But the gravity of giant Jupiter exerts tidal tugging that warms Europa's insides, just enough to keep a layer of water melted under its frozen surface.

Water clues appeared in pictures taken by NASA's Galileo spacecraft in 1996 as it orbited Jupiter. The pictures supported earlier theories about a hidden Europan ocean. On some parts of Europa's surface, for example, blocks of ice have broken apart and rearranged themselves as if by floating, like Arctic ice floes, on a fluid underlayer.

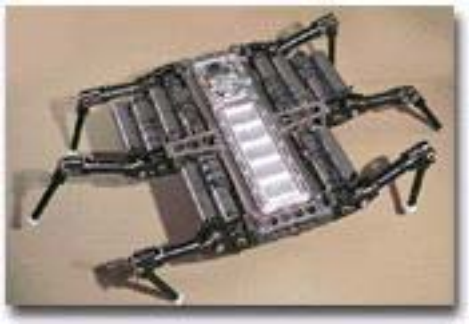
Some facts about Jupiter are these:

Mean Distance from Sun	778,412,010 km (4.84 x 108 miles)
Diameter	142,984 km (88,846.1 miles)
Volume (Earth = 1)	1,316
Mass	317.8 (Earth = 1)
Density	1.33 gm/cm3
Surface gravity	2.34 (Earth = 1)
Rotation period (length of day)	0.41 Earth day (9.8 Earth hours)
Revolution period (length of year)	11.86 Earth years
Mean surface temperature	14.85 - 19.85 C (58.73 - 67.73 ° F)
Natural satellites	Four largest are Ganymede, Callisto, Io, Europa. Two of next largest are Amalthea and Himalia. Thirty-six others have been discovered.

05 The multiple missions of Argon One

The missions and goals of Argon One are many. Listed here are the primary missions of our colony: [1] Development of robotics for deep space application; [2] Research and development of Europan resources; [3] Study sediment deposits; [4] Map Europan ocean floor; [5] Study ion radiation and the effects of radiation on Argonians; [6] Study Europan/Jovian chemical reactions; [7] Develop alternative power sources including plasma collection, ion radiation collection and the electrolysis of water--hydrogen collection; [8] Harvest asteroids for carbon, iron, magnesium, nickel, and diamonds; [9] Research, development and preservation of Earth species--plants and animals]; and [10] Provide a shield of protection for Argon.

05a Development of robotics for deep space application



<---------- Robot worker capable of carrying payload on its back and using all six tentacles as arms or crawlers

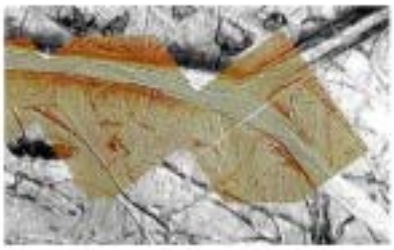
All construction work and labor-intensive tasks of Argon One and Argon Two are performed by robots. A fleet of 1,000 construction robots were launched from Earth before the construction of our colony began. 20 human programmers accompanied the robot workers to the construction site. The initial phases of Argon One were constructed using materials designed and manufactured by robots on Earth, transported to space using The Ribbon [discussed on pages 3 and 4], constructed in Earth orbit and thrusted to Europan orbit by robot rockets. Human interaction is very important to the development of robots for deep space application. All robots must be programmed to accomplish specific tasks.

Argonian Robotic Engineers continue to work on perfection of Accumulated Intelligence Robots [AIRs]. AIRs retain all knowledge embedded in them by human programmers, and use their embedded knowledge to make logical and intelligent decisions during construction. Working from detailed blueprints embedded in their knowledge base, these robots require very little human supervision in order to accomplish the tasks of construction and maintenance of Argon One and Argon Two. Human Observer Teams monitor the progress of robot workers. One great advantage of using robot workers is the fact that robot workers can work nonstop until the task at hand is completed. Once a task is completed, the robot workers can be reprogrammed [remotely] to begin work on another project, but they will retain the knowledge gained from previous projects for use on future tasks.

Robot workers are not only used as construction workers, but also as security sentinels, research assistants, educators, harvesters [in mine fields, crop fields, and natural resource collection], and in the performance of a number of other Argonian tasks.

05b Research and development of Europan resources

05b1 STUDY SEDIMENTS WHICH HAVE EMERGED THROUGH CRACKS IN THE SURFACE ICE OF EUROPA



<---------- Ridges and cracks in the surface ice of Europa

Scientists have long considered Europa, the smallest of the four Galilean moons orbiting Jupiter, as a prime candidate for life outside Earth because it is one of the few places in the solar system where liquid water may be found. One of the primary missions of Argon is Europan exploration focused on the identification of sites where signs of past or present life might be found and studied.

Assuming life arises quickly under appropriate formative conditions, life could be present wherever there is liquid water, a source of energy and essential elements. Europa is roughly the size of the Earth's moon, has a rocky interior, an outer shell of ice, and liquid water about 60 to 100 miles thick. Argonian scientists have found the existence of a salty liquid ocean beneath Europa's icy crust. This is just the environment that could provide favorable conditions for present life, or where signs of past life may be preserved.

Europa had been studied for years by examining data collected by unmanned spacecraft with onboard science instruments, but Argonian studies of Europa now focus on surface units, particularly in areas where geologic processes have caused Europa's icy crust to melt, and where organisms are protected from radiation and provided with an adequate food supply.

Argonian scientists have determined that the oceans lie between 3 and 10 miles beneath the icy crust of Europa. These scientists are now beginning to piece together the visible developmental history of Europa and determining how different pathways of energy, materials and nutrient interactions affect ecosystems of the satellite.

Sulfate has been readily observed on Europa's surface through use of stereoscopic instrument.. This sulfate is from a liquid ocean, and it was most likely formed by high-temperature fluids released at the oceanic floor from the satellite's silicate mantle. When these high-temperature fluids are cooled quickly, they provide the right conditions to support life.

On Earth, sulfates can be reduced through biologic activity in oxygen-free sedimentary basins or in organic-rich oceanic sediments. Presently, the amount of energy on Europa has been found to be insufficient to allow these biologic organisms to persist throughout the ocean's history. A periodic supply of organic compounds or other environmental factors introduced into the ocean could maintain life over time. If this process is detected in the chemical composition of Europa's oceanic water, this could be evidence of ancient life on Europa.

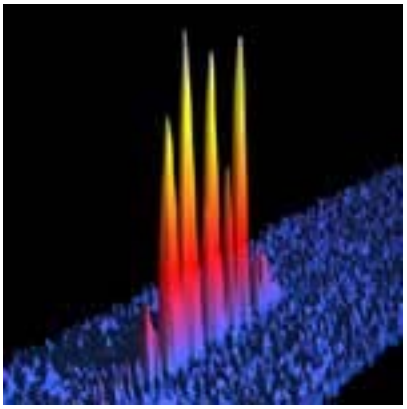
Argonian scientists have taken advantage of the wide cracks in Europa's surface, by inserting titanium tubes, 25 meters in diameter, into the cracks at several locations. These tubes are inserted by robot workers one section at a time until the tubes reach the surface of the Europan ocean, three miles beneath the icy crust. These tubes have opened up passageways for Argonian scientists and robot workers to descent into the Europan ocean in an effort to seek out and analysis life forms which might exist. 3-man pods are lowered by tethers from the icy crust Once the pods reach the Europan ocean, the tethers are detached and the pods become free-moving, scientist/computer propelled submarines. HPDs [Homing Position Devices--similar to GPS systems of the early 21st century on Earth] allow close contact with the pods at all times. Thusfar, no life forms have been located in the depths of the Europan ocean, but the work continues.

Argonian scientists have found folding features on Europa's surface, such as ridges, crests, and valleys, near a large fracture zone known as Astypalaea Linea. This folding appears to be caused by the pressure of matter rising through the cracks in the surface. Although the Europan "mountain ranges" are small by Earth standards, ranging in height from several dozen to a few thousand feet, we can learn a great deal from them. Their location near a fractured zone, and the direction of their ridges, confirm current theories that the gravitational pull from Jupiter is primarily responsible for the large cracks in Europa's surface.

The shape of the folds, their size, and the distance between them, indicates that the surface of Europa is composed of a thin rock layer covering a thicker layer of warmer mobile glacier-like ice. Finally, the similarities between the fractured surface of Europa and that of other icy moons in the solar system, suggest that similar folds may be found there as well.

Unlike Earthly geological features, the Europan "mountain ranges" are probably not permanent features of the Jovian moon's landscape. The folds "relax away" over time, pushing some of the "slushy" material back below the surface.

05b2 MAP THE OCEAN FLOOR OF EUROPA USING ATOM-WAVE SOLITONS



<---------- Atom-Wave Soliton

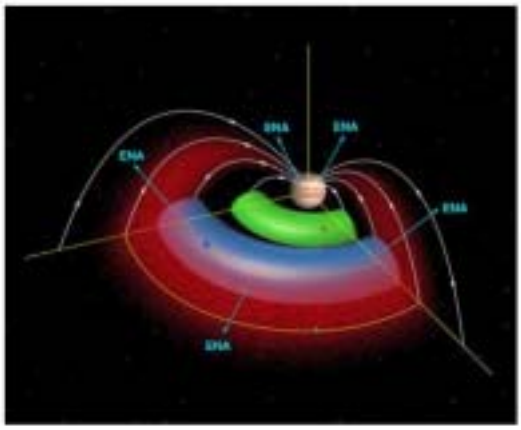
Argonian research on waves of ultra-cold atoms have lead to the development of atom lasers that help scientists map the subsurface ocean of Europa. The atoms were manipulated to form tidy bundles of waves, called solitons, which retained their shape and strength. Normally, when a wave forms -- whether in water, light or atoms -- it tends to spread out as it travels. This is not true with a soliton wave. It maintains its perfect shape without spreading.

One hundred and twenty years ago, no one imagined that lasers would be used to play music in cars or scan food at the grocery store checkout. Now we have developed atom lasers which improves instruments that study gravity variations to locate and measure underground water, minerals, oil, caves and volcanic magma. Atom-wave lasers enhance sensors used to produce 3-D maps of underground features. By measuring levels of underground magma, for example, scientists are able to predict volcanic eruptions. This technology is being used to map the ocean beneath Europa's icy crust. The 3-man pods which scan the Europan ocean for life forms are also equipped with atom-wave soliton lasers which are providing us with precise maps of the ocean floor.

Atom lasers are also being used to provide precise gyroscope navigation for Argon and our fleet of space vehicles.

05b3 ION RADIATION STUDY

Using sensitive new imaging instruments, Argon researchers have begun studying a large, dense gas cloud sharing an orbit with Europa. Stretching millions of miles around Jupiter, the donut-shaped cloud, known as a "torus," is believed to result from the uncommonly severe bombardment of ion radiation Jupiter sends toward Europa. That radiation damages Europa's surface, kicking up and pulling apart water-ice molecules and dispersing them along the moon's orbit into a neutral-gas



Jupiter's space environment shows magnetically trapped radiation ions (in red), the neutral gas torus of the volcanic moon Io (green) and the neutral gas torus of the moon Europa (blue). The white lines represent magnetic field lines.

torus with a mass of about 60,000 tons.

The cloud's mass indicates the intense radiation Europa faces has more severe consequences than Argonian scientists first thought. The mass also shows that Europa, in an orbit some 671,000 kilometers (416,000 miles) from Jupiter, has a considerable influence on the magnetic configuration around the giant planet.

Europa's gas cloud compares to that generated by the volcanically active satellite Io. But where Io's volcanoes are constantly spewing materials, mostly sulfur and oxygen, Europa is a comparatively quiet moon, and its water gas is a direct consequence of its icy surface being bombarded so intensely.

By acting as both a source and a sink of charged radiation particles, the dense gas torus gives Europa much greater influence than was previously thought on the structure of, and energy flow within, Jupiter's huge space environment, its magnetosphere.

Planetary magnetospheres glow with energetic neutral atoms, much like a red-hot piece of iron glows with photons of light, and such neutral-atom glows can be remotely imaged. Before now, no instrument had imaged that activity beyond Earth's magnetosphere. Energetic neutral atom imaging makes visible the three-dimensional structure of planetary space environments, which, until recently, were invisible to remote imaging techniques.

05b3a STUDY EFFECTS OF HEAVY ION RADIATION ON ARGONIANS

The effect of gamma [or heavy ion] radiation on space colonists is a major concern of Argonian scientists and researchers. Because of our close proximity to the heavy ion radiation of Jupiter, Argonian scientists have developed a radiation protection "cocktail" which must be con-

sumed by the inhabitants of Argon and all visitors to our colony. This cocktail of radioprotective agents reduces [and in most cases eliminates] the physiological changes caused by radiation exposure.

Space radiation represents an environmental hazard associated with space flight. Although data exist for human exposure to gamma rays, the physiological consequences of exposure to the high-energy charged-particle radiation which may be encountered in space is still not well understood. Previous studies have shown cell transformation caused by exposure to energetic protons and heavy ions, but the means by which this transformation occurs remains unclear. A goal of Argon's space radiation biology includes development of methods for prevention of potential radiation-induced cancers or other disorders during and after long-term space flights. As a step toward that goal, we are using human cells as model systems to determine the response of "normal" cells to charged particles in an attempt to destroy mechanisms associated with radiation sicknesses.

The work of Argonians scientists has produced: [1] a means by which to detect exposure to heavy ion radiation; [2] protection against heavy ion radiation; and [3] medical means of reversing the effects of heavy ion radiation in the event that colonists were exposed without proper protection. These processes eliminate the need for Argonians to wear heavy "protective gear" and work behind radiation shields, although radiation shields and protective clothing are standard issue for all inhabitants and visitors.

05b4 STUDY CHEMICAL REACTIONS WITH JUPITER'S RADIATION

In their search for microbial life on Europa, Argonian scientists have determined that heavy doses of lethal radiation surrounding Jupiter actually cause chemical reactions on Europa which provide fuel for life in the liquid ocean below.

Europa has in recent years been nominated by numerous exobiologists as the likeliest candidate in our solar system for extraterrestrial life, however small a form it might take. Most everyone agrees there are no fish swimming around on Europa. We're talking instead of small creatures. Very little things that might stretch current definitions of "life as we know it."

Finding one of these small creatures would be a great discovery, because it would imply that life can arise amid conditions very unlike those on Earth.

The ice layer of Europa's oceans has been found to be up to 3 miles thick. Sunlight cannot possibly penetrate the ice, and therefore photosynthesis cannot be the driving force for any possible subsurface life. At the surface, radiation is likely too intense for life to survive.

Seafloor hydrothermal vents have been suggested as a possible energy source; after all, they

support life on Earth. But oxidants are still needed, and in Earth's oceans they migrate down from the surface. We have not determined where oxidants might originate on Europa. Jupiter's radiation powers chemistry in Europa's ice.

Laboratory experiments show that when ice is bombarded with radiation, a host of possible fuels are produced--including formaldehyde. Common soil bacteria live off of formaldehyde. Radiation, interacting with water, also produces a suite of oxidants.

On Jupiter, charged particles in the planet's magnetosphere (similar to Earth's, but much stronger) bombard Europa. When the particles hit the ice, they tunnel through and create a high-temperature cylinder. For a brief time, chemistry takes place along that path.

The resulting formaldehyde, carbon dioxide, fragments of water and other substances become trapped as the tunnel re-freezes.

How the life-giving chemicals might make their way to the suspected liquid ocean below is not clear. Some ongoing process of mixing with the subsurface of Europa occurs. Spots on the surface of Europa show evidence of flooding, where water has filled in low-lying areas. One way to get [the chemicals to the subsurface] is to slowly bury them by flooding.

Tilted chunks of ice on the Europan surface hint at one possibility, where some unknown heat source triggers a massive melting. Chunks of ice might break off from large ice sheets, tilt and founder in a large pool of water that would mix surface substances with the ocean below, before refreezing.

05c Develop alternative power/fuel sources

05c1 PLASMA COLLECTION

The *plasma wave detector* listens for eerie-sounding "chorus" emissions. Chorus signals are low frequency plasma waves that produce strange whistling and popping sounds when converted to audio frequencies. By analyzing these signatures of plasma waves, Argonian scientists can detect energy flows between Jupiter's magnetic field and the material in the Io torus. Europa orbits Jupiter just at the outer edge of the Io plasma torus. Plasma wave observations show that there is an important interaction between the Jovian magnetosphere and this satellite, but the dominance of the Io torus likely overshadows some aspects of the interaction.

Argonians send robot worker transports to the outer edge of the Io torus to listen for, and collect this plasma. Converters onboard the robot transports transform this plasma energy into valuable electric power and store the converted power in fuel cells for transport back to the Cyber

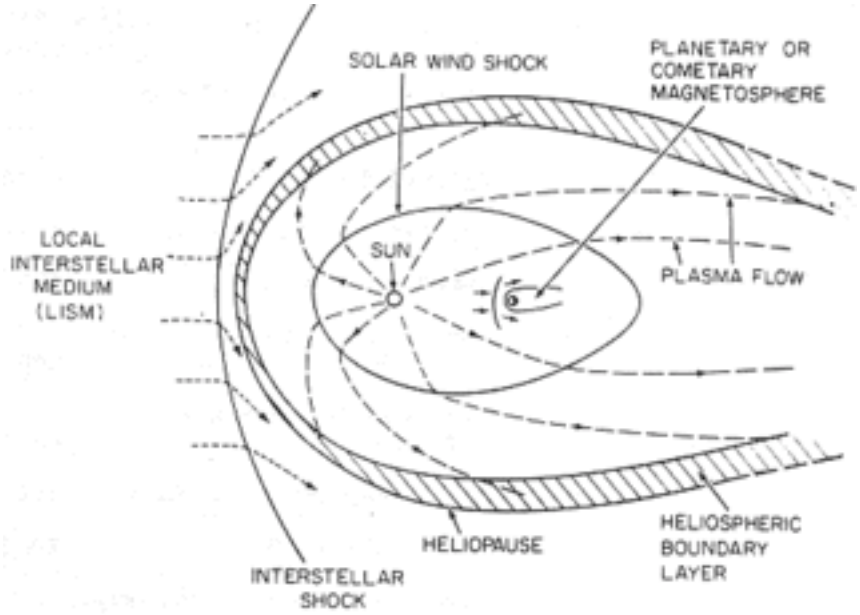
One Plasma Station [Electron 3E2 of Argon One]. Plasma collectors have also been deployed to the surface of Europa. A fleet of 200 mini-hoverbot collectors arrive at the surface via Argon Shuttle. Overseers [human programmers] conduct the operations of the plasma collectors remotely from Cyber One Plasma Station.

Plasma collectors are small self-contained robots which hover above the icy surface of Europa. When high plasma waves are detected, the collectors sit down on the surface. Each collector is equipped with a drill-foot which functions as a surface anchor. Each collector is also equipped with thrusters for movement along the surface of Europa, as well as booster power for return journeys to orbiting tankers. Plasma energy is "siphoned" into the collector. When a collector is full, it returns to an orbiting tanker, where the plasma is converted to electricity and transported back to Cyber One.

The plasma energy is further refined at the Cyber One Plasma Station and transferred to power chips which are sold to Argonians as power for personal vehicles, appliances, tools, computers, and communication devices.

Many people believe the space in between the Sun and its planets is empty, a vacuum devoid of energy or matter. But space is not empty. Our Sun constantly emits plasma, a superheated state of matter, which moves out in all directions at very high speeds to fill the entire solar system and beyond.

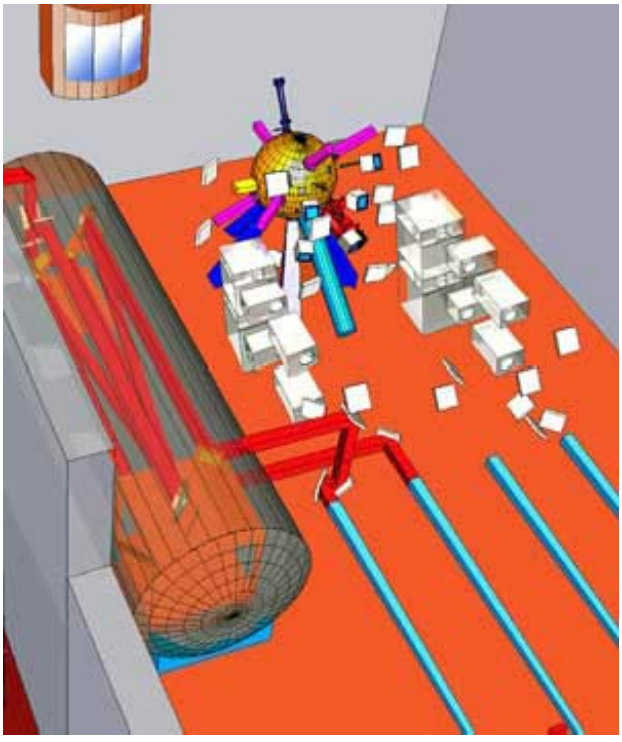
Plasmas are conductive assemblies of charged particles, neutrals and fields that exhibit collective effects. Further, plasmas carry electrical currents and generate magnetic fields. Plasmas are the most common form of matter, comprising more than 99% of the visible universe. Most plasma systems involve electrodynamics coupling across micro-, meso- and macroscale and (2) plasma systems occur over most of the physically possible ranges in space, energy and density scales. Some space plasmas have been measured to be less than 10 to the power -10 /m3. On one extreme, quark-gluon plasmas are extremely dense nuclear states of matter. For temperature (or energy), some plasma crystal states produced in the laboratory have temperatures close to absolute

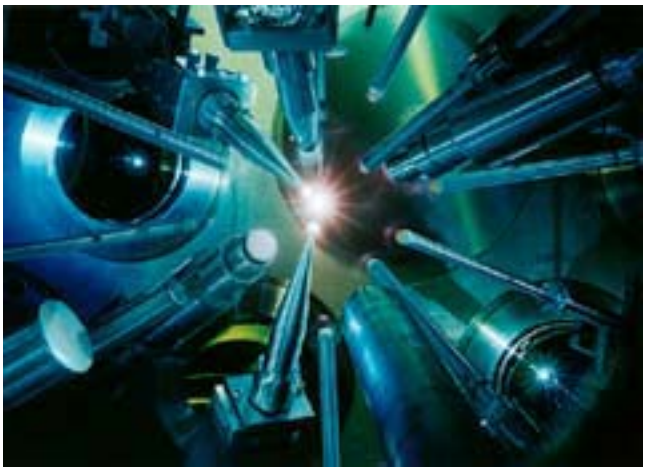


<---- Plasmas fill the heliosphere and local interstellar medium. The shape of the heliosphere results from a comet-like interaction with the surrounding plasma.

zero. On the other extreme, space plasmas have been measured with thermal temperatures above 10+9 degrees Kelvin and cosmic rays (a type of plasma with very large gyroradii) are observed at energies well above those produced in any man-made accelerator laboratory. Plasmas are radically multi-scale in space, energy and density.

The refinement of plasma for energy on Argon requires fusion reactors. Fusion requires energetic collisions of very light elements, usually hydrogen isotopes, resulting in a nuclear reaction that leads to more stable helium nuclei and other by-products. A net loss of mass results, yielding free energy.





<---- Argon Plasma Laboratory

05c2 ION RADIATION COLLECTION

The ion radiation present in the vicinity of Europa has but two choices: [1] to be harnessed, refined and used as an energy source; or [2] bounce around in space until all of its energy has been displaced. Argon has chosen to harness the power of ion radiation and provide the colony with another source of energy. Radiation collectors are robot workers whose purpose is to diffuse ion radiation and harness its energy.

Most suppliers of useful radioisotopes are produced regularly by neutron capture in nuclear reactors. Beams of neutrons are shot at billions of stable target atoms. A neutron is a good bullet. It has no electric charge. It easily approaches and enters a positively charged target nucleus. Then the target nucleus has more than its normal, comfortable amount of particles and energy. It has been made into a radioisotope.

For example, the element cobalt normally has 27 protons and 32 neutrons. When a rod of cobalt is bombarded by neutrons in a nuclear reactor, a few cobalt atoms capture one neutron and then have 33 neutrons. They have been changed from cobalt 59, which is found commonly in nature, to cobalt 60. Cobalt 60 is a radioisotope. It gives off gamma and beta rays. Cobalt 60 has a half-life of 5.26 year and is useful for treating cancer patients.

When the heaviest natural element, uranium, is bombarded with neutrons, it can capture a neutron, have nuclear changes, and be left with 93 protons. It is changed to neptunium, an element not found in nature. Further nuclear changes form an element with 94 protons, called plutonium.

A neutron fired at the proper speed at a heavy atom such as uranium can enter the target nucleus and cause fission. Atomic fission is the splitting of a nucleus into chunks that are radioisotopes. During fission, large amounts of energy are released. Fission energy is harnessed in nuclear power plants to generate electrical power.

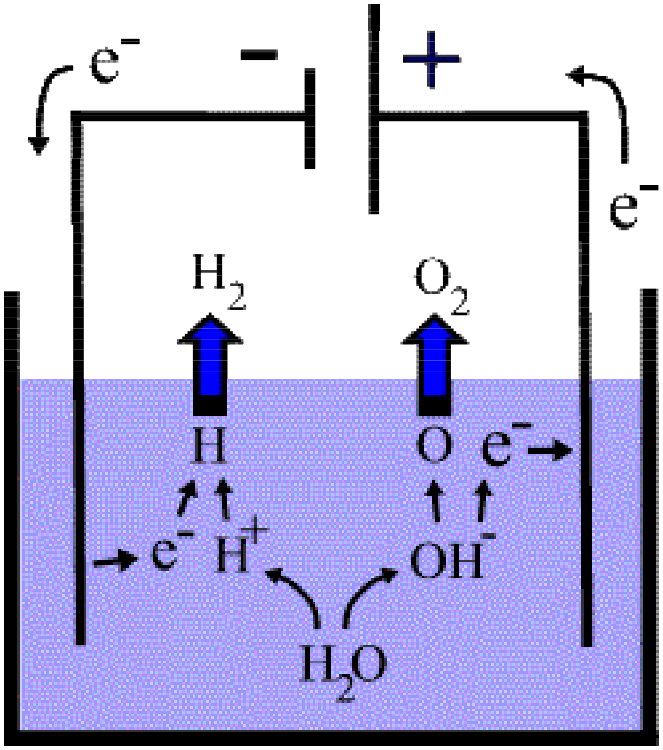
FYI: Alpha radiation can be shielded by paper; beta radiation can be shielded by aluminum, but gamma radiation must be shielded by lead.

05c3 ELECTROLYSIS OF WATER [hydrogen collection]

The process by which we generate hydrogen (and oxygen) from water is called electrolysis. The word "lysis" means to dissolve or break apart, so the word "electrolysis" literally means to break something apart (in this case water) using electricity.

Electrolysis is very simple–all you have to do is arrange for electricity to pass through some water between to electrodes placed in the water. Its as simple as that! If the electricity used for

electrolysis is generated from fossil fuels, then carbon dioxide would be emitted in support of our electrolysis process, and the advantage of using hydrogen as a fuel would be lost. But if the electricity is produced by solar cells, then there will be no pollutants released by our process.



Electrolysis: Splitting water with electricity to produce hydrogen and oxygen

The chemical equation for electrolysis is:

energy (electricity) + 2 H2O -> O2 + 2 H2 .

At the cathode (the negative electrode), there is a negative charge created by the battery. This means that there is an electrical pressure to push electrons into the water at this end. At the anode (the positive electrode), there is a positive charge, so that electrode would like to absorb electrons. But the water isn't a very good conductor. Instead, in order for there to be a flow of charge all the way around the circuit, water molecules near the cathode are split up into a positively charged hydrogen ion, which is symbolized as H+ in the diagram above (this is just the hydrogen atom without its electron, i.e. the nucleus of the hydrogen atom, which is just a single proton), and a negatively charged "hydroxide" ion, symbolized OH-:

H2O -> H+ + OH- .

You might have expected that H2O would break up into an H and an OH (the same atoms but

with neutral charges) instead, but this doesn't happen because the oxygen atom more strongly attracts the electron from the H - it steals it (we say the oxygen atom is more "electronegative" than hydrogen). This theft allows the resulting hydroxide ion to have a completely filled outer shell, making it more stable.

But the H+, which is just a naked proton, is now free to pick up an electron (symbolized e-) from the cathode, which is trying hard to donate electrons, and become a regular, neutral hydrogen atom:

H+ + e- -> H

This hydrogen atom meets another hydrogen atom and from a hydrogen gas molecule:

H + H -> H2,

and this molecule bubbles to the surface, and wa-la! We have hydrogen gas!

Meanwhile, the positive anode has caused the negatively charged hydroxide ion (OH-) to travel across the container to the anode. When it gets to the anode, the anode removes the extra electron that the hydroxide stole from the hydrogen atom earlier, and the hydroxide ion then recombines with three other hydroxide molecules to form 1 molecule of oxygen and 2 molecules of water:

4 OH- _> O2 + 2 H2O + 4e-

The oxygen molecule is very stable, and bubbles to the surface.

In this way, a closed circuit is created, involving negatively charged particles - electrons in the wire, hydroxide ions in the water. The energy delivered by the battery is stored by the production of hydrogen.

Water is the most important substance to life on Argon. It is a simple compound made from the two elements hydrogen (H) and oxygen (O), and each molecule of water consists of two hydrogen atoms and one oxygen atom. Thus we write the chemical formula for water as "H2O".

Hydrogen itself is also a very important element in the universe. For example, it is the fuel for the Sun, which generates power by fusing (combining) hydrogen atoms into a helium in a process call nuclear fusion. Because it can be obtained from water, the German's call hydrogen "wasserstoff", which literally means "water stuff".

Suppose that you just happen to have some pure hydrogen gas on hand, stored in a container. The hydrogen gas consists of H2 molecules zipping around in a container (hydrogen atoms like to bond together into H2 molecules). If there also happens to be oxygen gas around (O2), and there is always plenty oxygen in the air (air consists of about 20% oxygen), then the oxygen can react violently with the hydrogen gas, such that the hydrogen burns, or combusts, with the oxygen to form

water and heat, according to the chemical reaction

$$2H_2 + O_2 \rightarrow 2H_2O + \text{energy (heat)}.$$

Therefore, if you have some hydrogen, you can burn it for fuel to generate heat!

Generating heat, however, is not always the best thing to do, because entropy, which may be thought of as molecular disorder, is created when heat is generated, and that can limit the efficiency of devices that use that heat energy to do useful work. Fortunately, there exists a device called a fuel cell, which can chemically combine hydrogen with oxygen to make electricity.

Because of the vast amount of water available on Europa, electrolysis is the primary source of power for the Argon colony. Power stations have been established on the surface of Europa. Power generated on Europa is beamed to the colony and collected in switching stations at the Electrolysis Center, then distributed to all Electrons and the Nucleus at a cost to the residents, businesses and industries. Government, military, security and research sectors are provided with free electric power through the Electrolysis Center.

05d Harvest asteroids for carbon, iron, magnesium, nickel and diamonds

Since the protoplanets [bigger asteroids] which make up the bulk of the asteroids we see today were formed over a wide range of distances from the sun, their compositions vary greatly. The distribution of materials throughout the range of the asteroids is not even, due to orbital differences caused by Jupiter and Mars [and to a lesser extent by all of the other planets in the solar system]. Collisions between asteroids are common, and this causes individual asteroids to be shot further into or out of the solar system, but a fair amount of original distribution of material still exists.

Class C [Carbonaceous] Asteroids include about 75% of all asteroids. They consist of very dark material, mostly carbon, but they contain organic matter, water soluble salts, magnetite and clay.

Class S [Silicacaceous] Asteroids include about 17% of all asteroids. They contain metallic iron and magnesium silicates.

Class N [Metallic] Asteroids include about 8% of all asteroids. They are composed of mostly nickel or nickel and iron mixtures.

In addition to be classified by composition, asteroids are also classified by their location. Centaur Asteroids are farthest out, located between the orbits of Saturn and Uranus. Most of these objects are probably dormant comets from the Kuiper Belt which have been pulled in by the gravity

of the outer planets. Trojan Asteroids are located in the gravitational Lagrange points 60 degrees ahead of and behind Jupiter. These asteroids were probably once part of the main belt, but have been swept from their orbits by the gravity of Jupiter. Main Belt Asteroids include most of the known asteroids between Mars and Jupiter. There are many distinct bands because the gravity of Jupiter and the other planets tends to sweep certain areas of the asteroid belt clean. These are called “Kirkwood” gaps.

A fleet of robot workers have the distinct responsibility of harvesting Trojan and Main Belt Asteroids. These robot workers are equipped with thrusters to assist them in “pushing” the asteroids toward Argon. While enroute to our colony, another genus of robot workers are busy breaking down the elements of the asteroids. By the time they have arrived at Argon, the transport Asteroids have been decomposed and separated into their elements. A Shuttle Refinery accompanies each fleet of Asteroid robot workers. The asteroid elements are totally refined and ready to be used in industry upon their arrival at Argon.

05e Research, development and preservation of Earth species

One of the most ambitious missions of Argon is the research, development and preservation of Earth species [both plant and animal] which has been undertaken by the Biological Research and Development Center [BRDC]. Not only are they charged with the responsibility of insuring the survival of Earth species, they are also charged with the responsibility of providing food sources for Argon. For this reason, not only is BRDC a wildlife/wild plant refuse, it is also a hydroponic farm.

All plants in the food-production sector of BRDC are grown hydroponically. The plants are suspended in a soil-free environment with a lifeline of necessary nutrients constantly flowing to them. The artificial sunlight generator helps the plants to grow in a near-natural environment. Evaporation and condensation generators help regulate the seasons of BRDC. Vegetables grown for consumption by Argonians include corn, carrots, beans, peas, cucumbers, lettuce, tomatoes, potatoes, broccoli, asparagus, onions, thyme, parsley, sage, squash, bell peppers, and pumpkins. Fruits include bananas, apples, oranges, kiwi, grapes, watermelon, lemons, limes, berries, cantaloupe, pineapple, mangos, papayas, coconuts, grapefruit, tangerines, tangelos, and cherries.

Production of protein-based foods is also accomplished in the BRDC. “Real” animals are not consumed on Argon. Synthetic protein-enriched food supplements are manufactured in the BRDC and are included in the regular diets of Argonians. Domestic animals are part of the populous of the BRDC. These animals help add an element of Earth to the Argon setting. Argonians can take advan-

tage of the Earth-like settings of the BRDC by spending weekends or extended vacations in the "backcountry" areas of the BRDC. The countryside allows Argonians to interact with domestic animals such as cows, chickens, sheep, horses, goats, dogs, cats, fish, birds, deer, and rabbits. Domesticated cats and dogs can be adopted from the BRDC and kept in the communities of Argon. The BRDC Backcountry provides nature trails, horse trails, backpacking and hiking trails, swimming holes, and other backcountry "luxuries". Wild tours are conducted throughout the refuse areas. Tourists are transported in flying pods. These pods appear as mirrored on the outside, but they are transparent from the inside, allowing tourists full view of their surroundings.

Animal species are transported from Earth in cryostorage chambers [frozen during transport]. The journey from Earth to Argon takes approximately 4 years. Upon arrival at Argon, the frozen embryos are transferred to life cycle accelerators when needed. Life cycle accelerators develop the embryos at a somewhat faster pace than normal growth, so the species can be introduced into their new environment, observed, and cared for. When endangered species are restored to prominence, embryos from the new clan are transported back to Earth and reintroduced to their native environment.

<---------- Yellow-tailed Woolly Monkey on the Threatened List

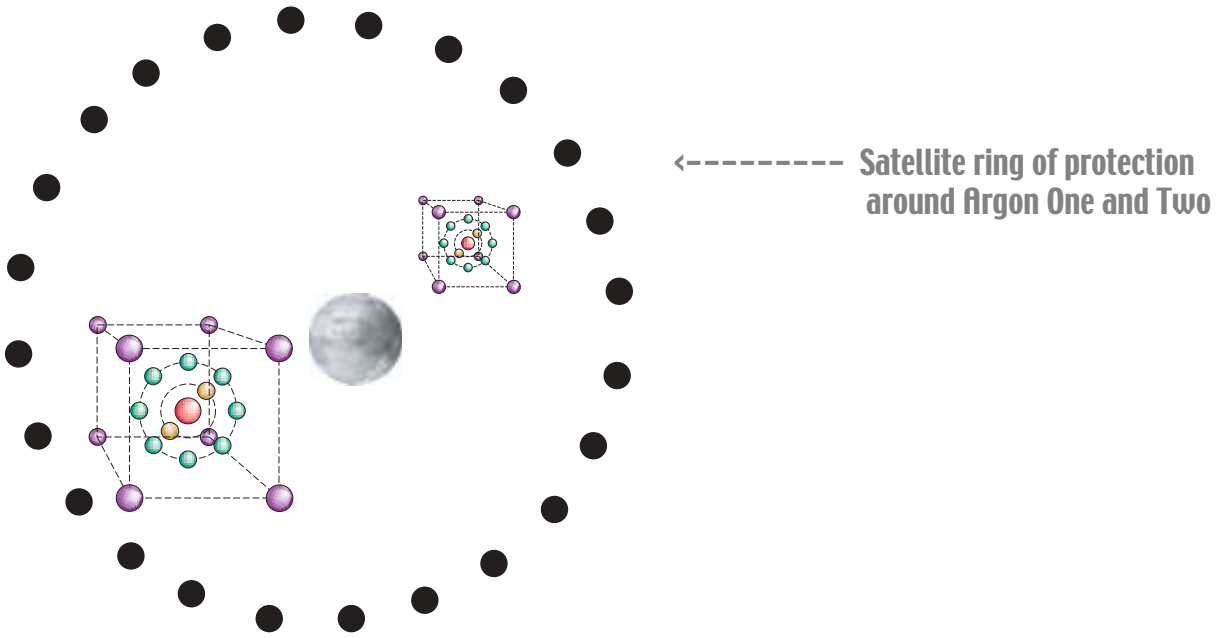
The list of threatened species which have been transported to the BRDC from Earth at this time includes: Baiji (Yangtze River Dolphin; Vancouver Island Marmot; Seychelles Sheath-tailed Bat; Javan Rhino; Northern Hairy-nosed Wombat; Hispid Hare; Tamaraw (Dwarf Water Buffalo); Dwarf Blue Sheep; Tonkin Snub-nosed Monkey; Yellow-tailed Woolly Monkey; Kouprey (Cambodian Forest Ox); Malabar Large Spotted Civet; Sumatran Rhino; Iberian Lynx; Visayan Spotted Deer; Indus River Dolphin; Saola (Vu Quang Ox); Hirola (Hunter's Hartebeest); African Wild Ass; Addax; Black-faced Lion Tamarin; Vaquita; Arabian Oryx; Ethiopian Wolf; Mediterranean Monk

Seal; Hairy-eared Dwarf Lemur; Riverine Rabbit; Muriqui (Woolly Spider Monkey); Giant Panda; Golden Lion Tamarin; Golden Bamboo Lemur; Golden-rumped Lion Tamarin; and Greater Bamboo

As new species are placed on the threatened list, representative embryos are transported to the BRDC for revitalization and reintroduction.

05f Provide a shield of protection around Argon

With a colony as large and complex as Argon One [and eventually Argon Two], security, protection and defense must be a consideration. Defense of Argon includes defense from potential enemies and from natural dangers, such as errant asteroids, meteors, and other space debris. Although Argon is a peaceful settlement, we have a shield of defense capable of defending ourselves against possible intruders. Other colonies exist throughout the solar system. Some of those colonies are not as noble as Argon. Argon has a ring of protection in the form of defensive satellites. These satellites are armed with remotely-controlled laser canons and conventional ordinance, equipped with radar detection devices, and each satellite can be manned when necessary. A central command hub is located at the Argon Security Base. Human monitors track all objects which have been alerted by the remote satellites. Human monitors make final decisions on whether to react to incoming or not. Roaming defense vehicles keep watch on near-asteroids and other space objects In the event that one or more of these objects place Argon in danger, the roaming defense vehicles are equipped with Asteroid Thrusters which can be placed on an asteroid and activated. These thrusters can “push” an incoming asteroid out of Argon’s path.



06 Argon Culture

PURPOSE: Argon exists as a joint-effort of the peoples of Earth in an attempt to utilize the resources of Europa and establish a human presence in deep space. Argon maintains many missions, as seen on the previous pages. Our goal is to live peaceful, productive lives to the betterment of mankind.

GOVERNMENT: The government of Argon consists of a Council of Representatives, one from each of the Electrons [Electrons refer to the different sectors of Argon. As with the element Argon, our colony consists of 18 Electrons and one Nucleus]. The Council of Representatives has 19 members, with a leader being elected from their number. The leader is known as the Council Head. The Council Head only votes in matters which have been voted to a tie by the other 18 members. The members of the Council of Representatives include: [1] Council Head; [2] X-Complex Commissioner; [3] Denominational Arbitor; [4] Resort Complex Director; [5] Robotics Manager; [6] Dean of Argon University; [7] Argon Manufacturing Facility Manager; [8] Argon Hospital Director; [9] Argon Industrial Facility Manager; [10] Scientific Research Coordinator; [11] Biological Research Coordinator; [12] Deployment General; [13] Plasma Station Manager; [14] Training General; [15] Radiation Collection Manager; [16] Security Base Commander; [17] Electrolysis Center Manager; [18] Argon Military Commander; and [19] United Council Chief. Laws, rules, and regulations are established and administered through the Council of Representatives.

COMMUNITIES: There are 18 communiteis [subdivisions] in the Nucleus of Argon. These communities have all the conveniences and luxuries of like communities on Earth. There may be as many as 100 family units in each community. Communities contain grocery stores, restaurants, community libraries and fitness centers. Dogs and cats [one pet per family unit] are allowed only in the communities. Strict leash laws are in effect. There are also communities in Shell One Electrons and Shell Two Electrons. Persons working in a specific Electron may wish to live in the same Electron for ease of travel to and from work. The only personnel who live in Electron Three and Security and Military personnel. Homes in the communities are designed to accommodate 3-person families. More than one child per couple is highly discouraged.

RETAIL CENTERS: There are 18 Retail Centers in the Nucleus, so most of the major shopping takes place in the Nucleus. There are monthly shuttles arriving from Earth and other colonies in our solar system. New and interesting items are continually coming into Argon. Most things needed or

wanted by Argonians are manufactured right here in Argon. Raw materials are harvested from asteroids and production facilities in Shell Two provide the goods. A new metal has been developed by Argon scientists and engineers. When heated, this new metal can be programmed to take on a new shape, making the wishes and desires of Argonians virtually at their fingertips. Whatever you can imagine, we can produce.

RELIGION: Same community chapels are dispersed throughout the colony. Major religious facilities are located in Shell One at the Multi-Denominational Religious Center. Shuttle buses are available on Sundays to transport Argonians to and from the MDRC.

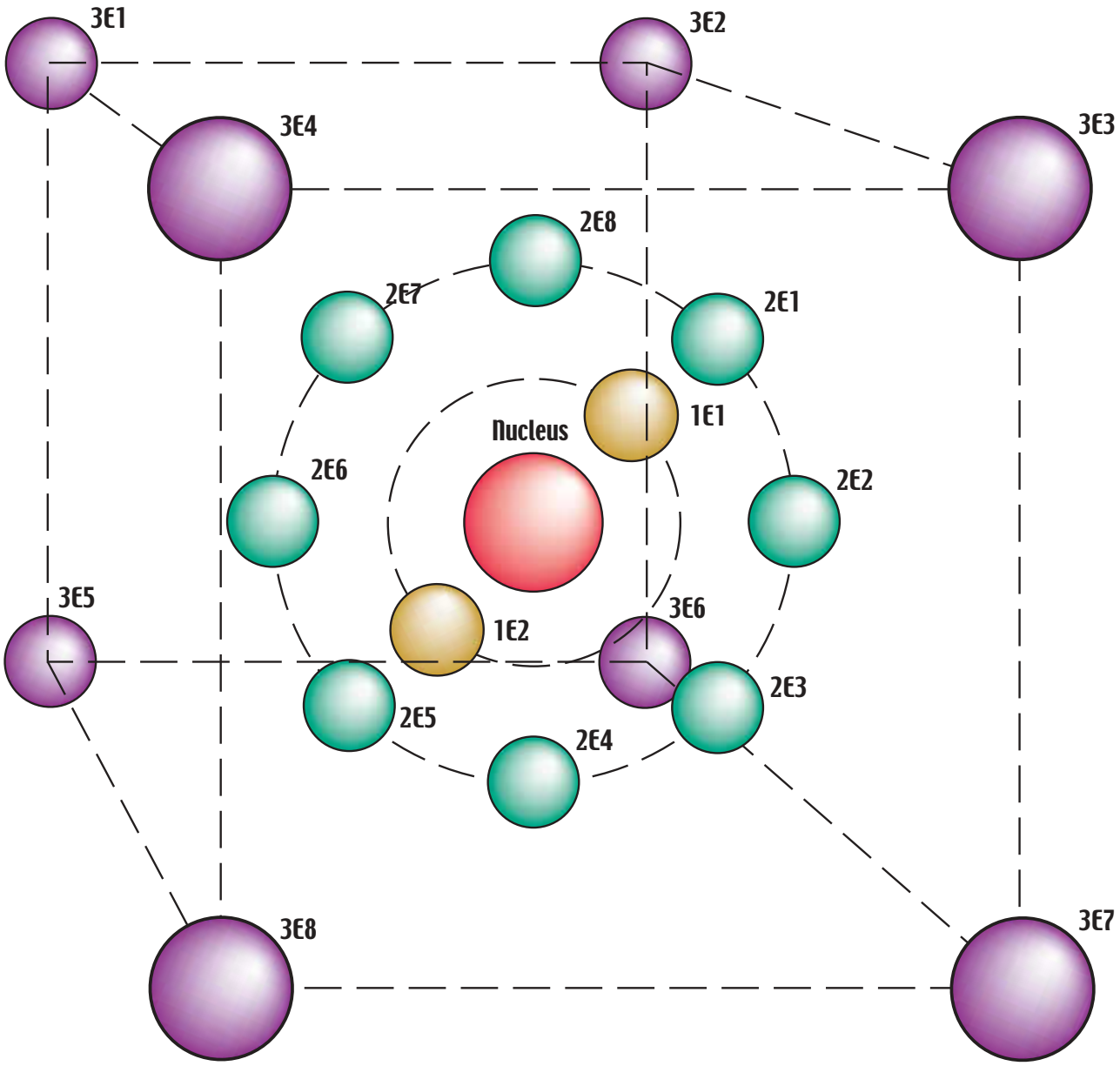
TRANSPORTATION: Within communities, moving sidewalks are the primary mode of transportation. Although hoverboards and hoverboots are quite popular among the younger set, and P.E.T.S. [Personal Excursion Transportation System] are the mode of choice for the older set. Each Electric/Hydrogen-powered PETS is capable of transporting three individuals. In additional to these modes of transportation, Multi-Directional Elevators may be used for limited travel within the Electrons. MDEs are capable of traveling in any direction, along established MDE thoroughfares. Between Electrons, commuter shuttles are provided for quick transport. Commuter shuttle terminals are located at regular intervals around the perimeter of each Electron. For work in an outside environment, jetpacks are available. Most of the work outside the confines of the Electrons is done by robot workers.

AMENITIES: Food is produced and sold through the Biological Research and Development Center. Water is produced and sold through the Electrolysis Center, and power is produced and sold through Cyber 1 Plasma Station, Radiation Collection, and the Electrolysis Center.

SECURITY: Security for the Electrons is provided by the Argon Security Base. Patrolmen are assigned to each of the Electrons, with substations located at convenient intervals throughout. Patrolmen are equipped with stunguns. There are no lethal weapons allowed in the Nucleus, Shell One, or Shell Two. All stations in Shell Three have security and/or military personnel equipped with lethal weapons.

Argon Colony

Red=Nucleus [N] Yellow=Shell One [1E] Green=Shell Two [2E] Purple=Shell Three [3E]



Nucleus
18 Retail Centers
18 Communites
4 Government Centers

1E
1E1=X Complex [Sports]
1E2=Multi-Denominational Religious Center

2E
2E1=Resorts
2E2=Robotics
2E3=Argon University
2E4=Manufacturing Fac.
2E5=Correctional Fac/Hosp
2E6=Manufacturing
2E7=Black Hole/Seti Res.
2E8=Biological Research

3E
3E1=Military Deployment
3E2=Cyber 1 Plasma Station
3E3=Strategic/Tactical Trng
3E4=Radiation Collection
3E5=Security Base
3E6=Electrolysis Center
3E7=Argon Military Base
3E8=United Council

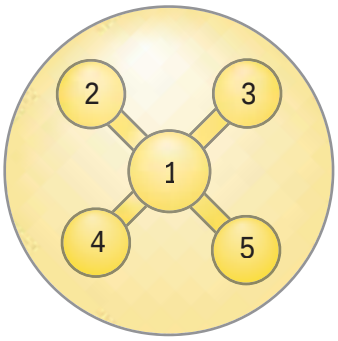
07 A Closer Look at Argon

07a Nucleus

The Nucleus is the pulse of Argon. All executive, judicial, and legislative decisions are made here. The Nucleus is also the center of life on Argon. The major communities are here, complete with community theatres and town halls. The major shopping areas are in the Nucleus. When it's time to do "downtown", the Nucleus is the place to be. The Nucleus is protected by an outer bubble.

07b Shell One

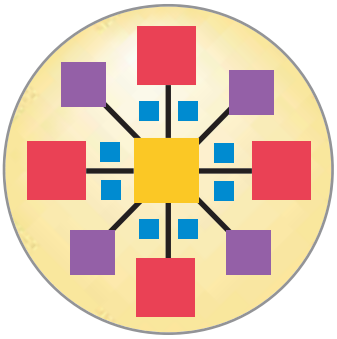
1E1: X-COMPLEX [SPORTS]:



<---------- X-COMPLEX
1 = Restrooms, concessions, offices, viewing areas, track and tennis facilities
2 = Basketball/volleyball facilities
3 = Racing/swimming/paintball/workout areas
4 = Football/soccer facilities
5 = Baseball/golf facilities

Gravity generators provide an environment of normal Earth gravity for the entire X-Complex. All facilities within the X-Complex Electron bubble are domed. Ample parking is provided in the open areas around the X. Only one sports tournament at a time is played [ie, if football is in tournament, no other sport will compete for spectator time]. Professional and amateur leagues exist in the major sports [football, baseball, basketball, and soccer]. Amateur leagues exist in all other sports. Facilities 2-5 can be easily converted to accommodate other sports as needed.

1E2: MULTI-DENOMINATIONAL RELIGIOUS CENTER:



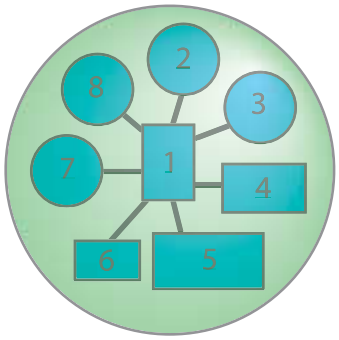
<---------- MULTI-DENOMINATIONAL RELIGIOUS CENTER
Red = Large Centers
Blue = Shops
Purple = Small Centers

The purpose of the Multi-Denominational Center [MDC] is to bring people of different religions on

Argon together in peace. In the larger yellow square, the "leaders" of each religion meet and discuss important issues within the sector. In the smaller red squares, the four larger religious groups [Christians, Jews, Muslims, and Buddhists] have their meetings, sermons, and prayer places. In the small purple squares, the smaller religions have their worship places. The blue squares represent shops where you can buy copies of religious writings as well as food. There are also libraries in the shop areas. Instead of using books, information is stored on compact disks. When these disks are put into computer drives or TV movie viewers, a computer animation of the book and its pages appear. The person who is "reading" the book can control the book remotely. A security code is embedded in the disk so that when a person tries to copy the CD, it can't be copied. Everyone believes differently, so the point of the MDC is to bring people and their ideas together without arguing. The outer bubble of the MDC continuously projects images of a calm, blue Earth sky.

07c Shell Two

2E1: RESORTS:



<---------- RESORTS
1 = Entertainment Center
2 = Islands of Adventure
3 = Universal Studios
4 = Malls and Shops
5 = Hotels and Resorts w/beach & boardwalk
6 = Restaurants
7 = Six Flags Over Europa
8 = Disney World/City Walk

Relaxation and vacation is very important to Argonians. The Resort area provides entertainment and fun for the entire family. All of the theme parks in Argon Resorts are virtual rides. The Entertainment Center contains Virtual Reality Adventures where patrons can program their own adventures, such as mountain climbing, hang gliding, parachuting, mountain biking, rock climbing, snow skiing, and the list goes on. Space Cruises also embark and disembark here.

2E2: ROBOTICS: Research and development in the design and deployment of robot workers and other robotics is conducted here. ROBOTICS also contains a maintenance and manufacturing area for the fleet of Argon Robot Workers. Robot workers are contracted out from this location.

2E3: ARGON UNIVERSITY: The major courses of study at Argon University are Space Engineering, Bio-Medical Engineering, Astronautics, Robotics, Laser Energies, Plasma Energies, Radiation Energies, Interplanetary Navigation, Astronomical Navigation, and Military Science. Children begin their education process at the age of 6. At 12, children must determine a major course and their college education begins. During the years from 6 to 12, schooling is accomplished at home through holographic distance learning. At 12, classes are held on-site at the university. Training at the university lasts until age 18, or at such time that the pupil is prepared to leave [be it less than 18-years-of-age or more].

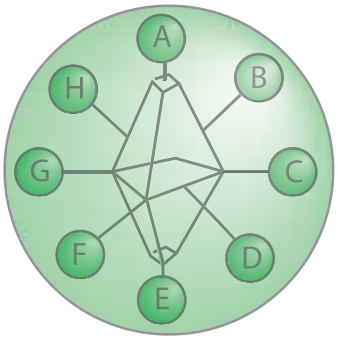
2E4 and 2E6 MANUFACTURING FACILITIES: Argon is a self-sufficient colony. Almost all goods, appliances, and needs are manufactured here. Imports do arrive monthly from Earth and other colonies, but these are considered luxuries and are priced accordingly. Through advancement technology, programmable metals and polymers are used for most manufacturing. Items producing used these materials can be reprogrammed to take on other shapes and functions.

2E5: CORRECTIONAL FACILITY/HOSPITAL: Three-fourths of this complex is dedicated to hospital/medical facilities and the other fourth is dedicated to correctional facilities. There are not very many incarcerations in Argon. If problems arise with individuals, the individuals are usually banished from the colony and returned to Earth, at which time they will be imprisoned there. We are a busy colony, and do not have the time or the desire to deal with malcontents.

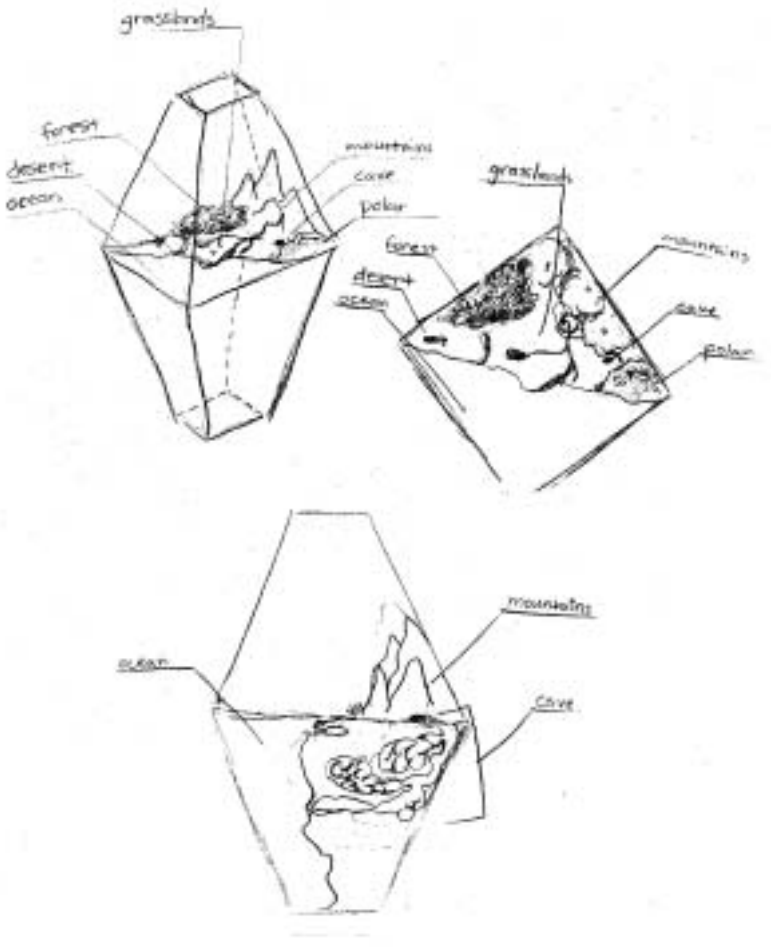
2E7: BLACK HOLE/SETI RESEARCH: This is a research facility of Argon University. The search for extraterrestrial life in the universe is conducted from here. The search and study of space phenomenon such as black holes, quasars, and quarks is also conducted here. Interplanetary science and research shuttle flights originate and end here.

2E8: BIOLOGICAL RESEARCH AND DEVELOPMENT CENTER [BRDC]: One of the main missions of Argon is the BRDC. BRDC workers live in the communities of the Nucleus, but the Key Scientists and BRDC Maintainers live in the BRDC. Gravity generators help provide a constant Earth-like environment for the BRDC. The bubble surrounding the BRDC is programmed to simulate sunshine. The sun rises in the east and sets in the west every 24 hours, just as it would on Earth. Sunrise and sunset occur just as they would on Earth. Evaporators and condensers help maintain a

constant Earth atmosphere by providing rain showers and clouds for the BRDC. On a limited basis, Argonians are allowed to vacation inside the BRDC. The waiting list is long and a strict no-impact policy is in effect. Visitors must leave no trace of their visit behind. Violation of this no-impact policy will result in loss of BRDC vacation privileges. The maintainers take their job seriously. The animals are provided with all the elements of their home environment. Maintainers patrol the BRDC in silent-flying pods. Maintainers only intrude into the environment of the animals to check on the health and well-being of the animals, and to make sure their food and water needs are being met. The Hydrosphere inside the BRDC provides a saltwater ocean and a freshwater lake.



<---------- BRDC
A = Gravity generator
B = Food manufacture and storage
C = Fruit and vegetable production
D = Laboratories
E = Gravity Generator
F = BRDC Community
G = Farm Animals
H = Nature Resorts



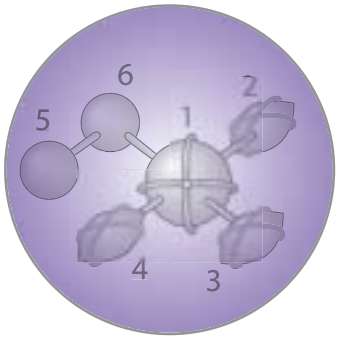
<---------- BRDC Detail

07c Shell Three

3E2: CYBER 1 PLASMA STATION [see page 15 for details]

3E4: RADIATION COLLECTION [see page 18 for details]

3E6: ELECTROLYSIS CENTER [see page 18 for details]



<---------- ENERGY CENTERS [all three constructed alike]
1 = Community
2 = Power generation plant
3 = Collection facility
4 = Convertor
5 = Mining operations
6 = Research and development

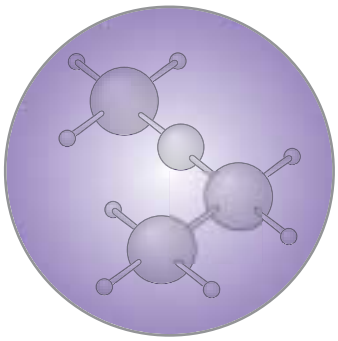
3E1: MILITARY DEPLOYMENT: In the event of civil disturbance [caused by natural occurences or hostile activity] deployment of defensive and offensive units will take place from Military Deployment. One-man, two-man, and 10-man military pods are docked at Military Deployment [MD] and stand ready to deploy at anytime. MDs are equipped with laser-guided munitions which can be used in tactical maneuvers, but they may also be employed in asteroid [or other small near-Argon objects] removal. 10-man Fire Teams make up the MD Company based on Argon. A 10-man Fire Team consists of pilot, navigator, communicator, munitions, technical support, 4 gunners, and team leader.

3E3: STRATEGIC/TACTICAL TRAINING: Military Weapons Design Group: The purpose of the MWDG is to supply Argon military and other sources who may use our technologies and materials with suitable technologies concerning military or security measures. MWDG supports military, colony security and colony defenses. Meetings with customers can be called as needed along with a biannual meeting with customers. MWDG designs and creates weapons for orbital defense laser systems and backup pulse wave devices used for deflecting objects away from the colony. Our research , development and testing facility utilizes drone asteroids to test our defensive weapons. All weapons systems are constructed by robot workers. Materials used in the construction of our weapons systems are all harvested from asteroids. Our Research Group contains a think tank of scientists from the Weapons Design Group, Colony Security Group, and Colony Defense Group. Weapons used by Security/Police force are sonic pulse stun guns. There is no real need for lethal weapons.

3E5: SECURITY BASE: 2-man Security Teams are deployed from the Securrity Base to all Electrons and the Nucleus of Argon on a shift-basis. Security Base is the base of operations, but most Security Teams [STs] are stationed in the individual Electrons to provide around-the-clock security and protection to the residents and workers of Argon. STs take care of accidents which might occur in Argon. There are several types of STs based at Security Base. They include: [1] Police ST; [2] Hazard Control ST; [3] Medical Emergency ST; [4] Surveillence ST; [5] Command and Control STs. If larger security forces are needed, Security Squads can be deployed as 10-man, 20-man, or 40-man units. The Command and Control Center for Argon is located at Security Base.

3E7: ARGON MILITARY BASE: Strategic, tactical, logistical, interplanetary, domestic combat, and weapons management training is conducted at the Argon Military Base. Troops are trained here and then transfered to Military Deployment as their base of operations. The military command and control center is located at Argon Military Base.

3E8: UNITED COUNCIL: United Council provides a secure, secluded environment for briefings, meetings, and summits which might be attended by officials from Earth and the numerous colonies throughout the solar system, as well as members of the Expeditionary Force now on mission beyond the confines of our solar system. As a base of rest and relaxation, Expeditionary Force members and other interplanetary diplomats often stop at Argon to take advantage of the resortlike setting of United Council. Temporary housing, shopping areas, parks and fitness centers dot the landscape of United Council, providing visiting dignitaries with all the comforts of home.



<---------- MILITARY/SECURITY BASE LAYOUT
Details of Security/Military bases confidential

08 Plans for Argon Two

Another colony identical to Argon One is now under construction. Argon One is in geostationary orbit above the north pole of Europa. Argon Two is being constructed in geostationary orbit above the south pole of Europa. Argon One and Two are in polar orbit to avoid some of the electromagmetic and radiation effects encountered a equatorial locations around Europa. The radiaition torus does not extend to the poles. There will not be a duplication of efforts. The primary mission of Argon Two will be the research and development in the areas of time travel, worm holes, space propulsion, and exploration of regions beyond our solar system.

09 Conclusion

Much progress has been made since the early days of Argon One. All the industrial nations of the world have joined together to make this and Argon Two a reality. Success has been attained and we look forward to the discoveries and adventures that lie ahead. The reaches of space are only limited to the imagination of the dreamers and the colonists of Argon are dreamers of the future.

10 List of Illustrations

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