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A Colony on Mars

FORWARD

Based on what information we now have it appears that it might be possible to place a self sustaining colony of human beings on Mars. All of the necessities seem to be available. We now know that there is plenty of H₂O water available beneath the thick layer of frozen CO₂ Carbon Dioxide at the South Pole. It is assumed that the situation would be the same at the north

pole. There is also good evidence that there is liquid H₂O water flowing beneath the surface of the planet. The known water at the South Pole alone would be adequate to cover the entire planet with pure water to a depth of approximately thirty six ft. So, at worst ample water would be a solvable problem.

Habitat is a problem because the Martian atmosphere is ninety five percent Carbon Dioxide, and only 3% nitrogen whereas the atmosphere of Earth is 78% or so nitrogen, 21% oxygen and less than 1% Carbon Dioxide. There is a solution to this problem. Recent photo's have shown that below the surface of Mars there are many large fissures, cavern's if you will. One is known to be at least three times as wide as the Grand Canyon, three times as deep and nine times as long. This would not be a little cramped space it would be about the size of the State of Rhode Island. A breathable Earth like atmosphere can be made with water and nitrates. There would be plenty of water. Initially smaller more manageable caverns could be used while work was being performed on larger caverns. Caverns could eventually be interconnected. One estimate I recently read was that there were caverns beneath the surface of Mars equal to the size of the Continental United States. This would be a large habitat indeed.

Gardens could be grown underground using electric grow lights. There are already new strains of plants being developed on Earth that are far more efficient at photosynthesis, the process of converting Carbon Dioxide to oxygen. If sufficient Nitrates are available to the plant from the soil then the plant will consume Carbon Dioxide and produce a breathable atmosphere for man.

At present the mean temperature on the surface of the planet is fifty five degrees below zero, Fahrenheit. The warmest temperature ever recorded on Mars was eighty degrees above zero, Fahrenheit. Mars receives far less sunshine than the Earth because it is further away from the sun. Twice a year during the equinox the wind speeds on the planet surface reach two hundred fifty to four hundred miles per hour. A man left unprotected on the surface would be dead in under a minute.

Mars is only seventeen percent the size of the Earth. Mars, in many ways is more comparable to Earth's moon than it is to Earth, except that the minimum gravity that man can survive comfortably in is 33% and Mars gravity is thirty five percent. Living in a pressurized cavern in an atmosphere rich in oxygen, taking the proper vitamins, getting plenty of exercise and spending some time in artificial gravity of one g, Earth's gravity could go a long way in making Mars more habitable. Mars has no ozone layer that protects the surface from exposure to extreme radiation. The radiation on the surface of Mars is deadly.

It has been said that all that is needed for survival is a reliable energy source. On Mars there are probably no fossil fuels however the frequent volcanoes indicate that geothermal energy would be plentiful. So much for heat and electricity.

The Martian soil is known to be extremely rich in iron. So far there is no information that I could find as to the presence of other minerals but with the high presence of iron there are bound to be others we just have not found them yet or reported them yet.

So there you have it everything that man would need to survive is awaiting him on Mars. The technology is already available all that we lack now is the resolve and the commitment.

NOTE: No time and date system has been universally accepted for keeping the time and date on Mars, at least not as of 2108. When and if Mars is ever colonized a standard will be established. Please go to <http://pweb.jps.net/~tgangale/Mars/faq.htm#day> where you can read everything you ever wanted to know about keeping track of time and dates on Mars. Some interesting facts are as follows: A Martian Day is 24 hours 39 minutes 35.24409 seconds long, a Martian year is 686.9726 Earth days in length. A Martian Day is called a Sol.

How does the eccentricity of Mars' orbit affect the seasonal variations?

Earth's orbit is very nearly circular, and so the four seasons last approximately the same number of days. The orbit of Mars, however, is a bit more eccentric (0.0934). In accordance with Kepler's laws of orbital motion, Mars travels more slowly in its orbit when it is further from the sun, and more quickly when it is nearer to the sun. Mars reaches its furthest point from the sun (called "aphelion") when it is spring in the northern hemisphere. This has the effect of making spring the longest season (193.30 sols), and summer the second longest (178.64 sols). Mars reaches its closest point to the sun (called "perihelion") when it is autumn in the northern hemisphere, and consequently autumn is the shortest season (142.70 sols), and winter is the second shortest (153.94 sols). On a calendar containing 24-months of equal duration, spring lasts seven months, while autumn lasts a little more than five. Summer has a little more than six months, and winter has a little less. This paragraph was plagiarized from the above mentioned website. I suppose that if this story is ever released as a book I will have to get permission to use it or completely reword it. Perhaps now you will understand that for the purposes of this fiction story the Author has taken license to have the characters in the story use Greenwich mean time and the Earth calendar and to say that the scientific community at the colony maintains and prominently posts the Martian time and date which is available to anyone planning to work on the surface.

Until the reader reaches PART II of this book he will have no idea of what the story is going to be about. I would encourage you however to not skip ahead to part II. If you do not read part I then part II will be meaningless. Part II begins about two thirds of the way through the book.

This story then will be the author's fictional concept of what might take place if mankind were to embark on a project to colonize Mars.

PART I

CHAPTER – Tim and Carla find work

May 28, 2107 : “Hey Honey, look at this ad in the Review Classified, I don't believe it, we gotta check this out tomorrow morning.” “Don't believe what you read Tim, you know, if it sounds too good to be true...” “I know Carla, If it sounds too good to be true it's not true.” “But I think this may be different. The ad was placed by Mars Colony, Inc. They have been working up there for several years now and they are hiring, and look at what they are paying!” “Lets see that ad, WOW”

“WORK ON Mars, That's right, we are now hiring in all categories, unskilled, skilled and professional. The lowest wage we pay is \$15,000.00 monthly to start. Ten year contract, required. All board and room equipment and uniforms furnished. Must be an English speaking U.S. Citizen, between 25 and 35 years of age, have a clean police record, pass a rigid physical examination, pass a drug test and have at a minimum a high school diploma. Bring your birth certificate, shot record, national ID and health card, copies of any diplomas or degrees and a detailed resume to Room 2277 Hempstead building between 8:00 AM and 1:00 PM any weekday.”

“We are here about the jobs on Mars, is this for real?” It sure is, just sign in and have a seat in the waiting room through that door, one of our counselors will be with you shortly.” There were about twenty others already seated in the large waiting room. It looked as though there might be quite a wait. A large table at the entrance was covered with stacks of printed brochures. They each selected two or three pamphlets, and found two seats together.

The man introduced himself as Hal Bergstrom, he addressed the entire group. “So either you people want to become Martians or the money brought you in, either way, you are here. I thought I could thin this crowd out a little before you go to your interview. As you probably already know Mars has the potential to support a population of over three hundred million people, but that is only the potential. Right now there are fewer than three hundred workers on Mars, their living conditions aren't the best. All but twenty seven of them are U.S. Government employees, mostly scientists and such. They presently reside in a cavern that covers about one half square mile.

Back in 2095, almost twelve years ago the Government sent in a work crew of five hundred men from the Army Corps of Engineers. These workers took two years to construct the present habitat. When they finished their

project, they left to returned to Earth.

“Once the Corps guys departed the Government people started to arrive. One of the first projects that they embarked on was mounting the telescope in a dome that had been constructed by the Army when they were there. This is not as large and powerful as some telescopes on Earth, or in Earth orbit, but Mars gets to view area's of the star systems that can not be seen from Earth. On Mars they have several large dishes mounted on the surface that allow searches by radio telescope.

There is plenty of water available in the caverns. “Everything else that they presently have use has been brought from Earth. Electricity is provided by a generator located in a walled off corner of the cavern. Atmosphere is manufactured by an apparatus brought from Earth.” Their toilet facilities are in yet another nearby cavern. They consist of porta potties separated for men and women. There is a tank of hot and cold water with a dozen showers and wash basins in each bathroom. The atmosphere has a stench to it, not just in the rest rooms but everywhere. When you first arrive you will be appalled by it but after a while you will hardly notice it.

If you are claustrophobic you do not want to take this job. The only way that a human can go to the surface is clad in a Mars suit, which is similar to a space suit. They do have plenty of water, underground rivers are plentiful. There are fish in the stream but you can't eat them they are poisonous. We really don't even want you touching them until we know more about them. There is a small video library and each of you will have a personal media player. That is about all there is to relieve the tedium of daily life.

Our company has had an average of ten employees there for the last five years, it has taken them that long to prepare, seal and pressurize a small cavern for the three hundred employees we are now hiring. This new Company cavern can be reached by a short tunnel from the main cavern. It was just recently pressurized with atmosphere which made it habitable. We are now ready to send in work crews. Mars Colony, Inc. has the contract from the Government for construction of all the additional necessities. Much of your work will be done in the hostile atmosphere on the surface of the planet wearing Mars suits. A Mars suit is very cumbersome to work in. We need to build a sewer plant, install indoor plumbing, with toilets showers, water heaters, a geothermal electric generation plant and run the electric wiring. In a few months we want to start tunneling toward the next cavern. Our eventual goal is a monster cavern located about six miles from the present caverns. You will be working a eight hour day, six days a week.

This round of hiring, for three hundred workers who will be leaving Earth on an interplanetary ship in early July of this year. Once you arrive, the only way you will have to communicate with Earth is by home video or letters that can be shuttled home whenever a ship from Earth docks. There are presently about four ships per Earth year. Mars years are twice as long as ours but don't worry your ten year contract will be for Earth years. Any of you who want an

interview please stay in your seats. If you have any doubts about that lifestyle please do yourself a favor and leave now.”

Eight people got up and left. Tim and Carla exchanged a long silent look into each other's eyes and then remained in their chair's. They were then ushered into what looked like a classroom with desks and terminals. The instructor in the front waited until they were all seated then the screens in front of each of them flickered on, an application appeared. After two hours they had finished the application. Some who had already finished had been ushered out. “There is always something that you don't think to bring, Carla remarked but I suspect that I will have time to provide it for them before we leave for Mars.

Carla was presently employed as a short order cook in a chain restaurant. Tim had finished high school early at seventeen. He had obtained his degree in engineering from Texas A&M at twenty one. When Tim was a student at A&M Carla was working as a cook in the cafeteria, that 's how they met. They were married when Tim graduated. It was a small wedding, attended only by Carla's family and a few friends from the University.

Tim and Carla had moved to Las Vegas two years before when Tim had been Laid off from his job as a drilling engineer in Houston, Tim had taken several construction jobs in the booming Las Vegas building industry just to put bread on the table but so far had not landed another engineering job. He had hoped to get employment in the mining industry as an engineer. There weren't many new wells being drilled in the U.S. anymore and many of the drillers and engineers were finding other employment. You might say that Tim just hadn't found himself.

They had the usual amount of personal debt, car payments and credit card bills but all of their bills and payments were current. They wanted a family and a home of their own, someday. For the time being they both had to work on their menial jobs just to make ends meet. The home and the family were something the future might hold for them.

June 1, 2107 : At their interview hey were given a longer version of the speech that they had earlier heard from Hal Bergstrom. The woman who conducted the interview seemed to be bent on convincing them not to take the job. They were told that if everything on their application checked out and if they passed their physical examination, and their psych tests, they would be hired. It was their lucky day. They were both offered jobs, Carla cooking in The Company mess hall and Tim working on one of the general construction crews. They would need to prepare a last will and testament and a living will. They would each need to open a bank account where The Company could deposit their pay checks. They would each have to have a signature card signed by the person or firm that they wanted to designate to handle their financial affairs for them for the next ten years. One nice thing they learned at the interview was that all money earned while working on Mars was free of all State and Federal Income tax.

The Psych test for each of them was scheduled on the same day. Tim and Carla didn't think it would amount to much. They arrived at 7:30 AM on the third and were sent back to the classroom where they had filled out their applications. At 8:00 AM the screens on the monitors lit up. They were told to read the question on the screen select the answer to the question and then click on next. One at a time they read the questions and selected the best answer. They were not told how many questions to expect but they did not imagine that the test would more than 100 questions. There were 250 questions. Most of the questions were preference questions, very few knowledge questions. After answering question 250 a message appeared on the screen that thanked them for taking the test and were told that they were free to leave. Both Tim and Carla finished just before noon. Carla was done a little ahead of Tim. She just remained in her seat until she saw that Tim had finished. By the time they left it was about noon so they went to lunch at a cafeteria across the street from the building and discussed the test they had just taken while having lunch.

"That was the stupidest test I have ever taken, have you ever taken a test anything like that when you were attending A&M, Tim? "Nope, that was completely new to me. I think that even though most of the questions seemed inane and pointless that Mars Colony, Inc. now has a pretty good idea of how our mental processes work, how we would be expected to react to any situation, how tolerant we are of other people, how patient we are and a lot of other stuff about us that maybe we don't know about ourselves. We are just going to have to wait them out until the results come back, however long that takes."

Before they left the cafeteria Tim's phone rang. He answered and was told by the girl on the other end of the line that he had done very well on the test. "You seem to have the exact psychological profile that we are looking for Tim. By the way, is your wife Carla with you right now? If so please tell here that she also did very well and fits the profile that we are looking for. You both passed, congratulations." "That part of their hiring process was certainly easy enough," said Carla. Little did Carla know that more than eighty percent of the people who took the test had been dropped from consideration for employment. It wasn't that they were bad people or that weren't intelligent, it was just that their test results indicated that they would not function well in the environment that they would be living in on Mars. The Company did not want to go to the expense of sending people to Mars that would be unhappy with their situation once they got there.

"My God, Tim do you realize what we are doing, you will be thirty six and I will be thirty seven before we get back home." "Well Hon, by the time we get back this won't seem like home anymore, and late 30's is a great time to retire and see the world. The way I have it figured we should have over three million dollars in our account by then." "Sure, if we last that long, we can return to Earth any time we want but it will cost us five hundred thousand dollars each to abrogate our contracts with The Company and an additional one hundred thousand dollars each for the trip back to Earth, that is what Tony told us at our

interview, remember. No, if we go we will stick it out for the ten years, no matter how bad it is. After all it couldn't be any worse than going to prison for ten years, could it?"

The trust department of their bank agreed to handle their financial affairs and they put a local attorney firm on retainer to periodically check up on the bank and receive their mail. The firm agreed to forward their important mail at every opportunity when a ship was leaving. For now they would get their mail about four times a year, hopefully that would increase to monthly before their contract was up.

Mars Colony, Inc. had given each of them a one hundred thousand dollars in advance pay which they had deposited in the bank, well most of it anyway. They kept out fifteen thousand for spending money although they had no idea where they would spend for on Mars. On the last week before their departure Tim and Carla had paid a final visit to the Attorney Firm that would be representing them and handling their legal affairs for the next ten years. They had left their car with an officer at the bank two days before they left for him to sell, pay off the loan and deposit the rest in their account.

They had visited their families, their friends, their dentist's and their doctors. Carla had a hard time saying goodbye to her parents and her brother but Tim only had his father to say goodbye to as his brother had been killed in Iraq in 2106 and his mother had died of cancer when he was a child. His father had remarried when Tim was a junior in high school. Tim never cared much for his stepmother, the feeling was mutual. Tim had an easy time of saying his goodbye's.

The night before they their friends had thrown them a big going away party. They were wondering if they could get any sleep at the Earth Orbiter or on the ship after boarding. They were both a little under the weather.

July 7, 2107: It was already over ninety degrees at 7:30 AM on the morning of their departure. After check in they made their way to the tarmac boarding area of the North Las Vegas airport where they were ushered aboard a Shuttle for their flight to the Earth Orbiter. The Shuttle looked a lot like one of those little commuter jobs but this was one that could take off from a runway on Earth, fly through the troposphere, stratosphere, Mesosphere, Thermosphere, Exosphere and on into space. Shuttle are capable of supersonic speeds but when they are used as space shuttles they fly at subsonic speeds until they enter space. At a certain altitude the engines on the Rocket propulsion system kick in and the jet engines shut down. They can return the same way for a soft landing on Earth.

From the Earth Orbiter they would board the interplanetary ship that would carry them to Mars. The ship they were to board was called Mars Supply Two. The other ship that made the Mars run on a regular basis was called Mars Supply One. They were told that each ship made two round trips per year. "Impressive names for one of mankind's greatest achievements, don't

you think, Tim.”

They were able to get a good look at the Mars Supply Two from a port hole on the Shuttle. It loomed much larger than they had expected. Since the ship had been constructed in space and would never leave space weight was not a consideration, nor was size. The ship was assume, It was cigar shaped, at least four hundred yards long and appeared to be about seventy five yards wide at the beam. It was enormous, They later learned that this would be only the second voyage to Mars that this vessel had made. Until last year there had only been The Mars Supply One. This ship was a carbon copy of The Mars Supply One.

They had a some misgivings about the flight that would take almost two and a half months, but they were given to understand that the ship would be very comfortable and spacious. Their time would mostly be taken up by training and orientation classes so that by the time they arrived at the Mars Orbital Station they would know about as much as it was possible to know about what to expect when they actually reached their new home.

CHAPTER - The trip to Mars

July 7, 2107: Upon arrival their Shuttle pulled along side the Orbiter then matched the orbital speed. They heard some clunking sounds then after about five minutes the door slid open. There were about 35 passengers on the flight from Las Vegas, most appeared to be in their mid to late twenties. Just as with a conventional airliner passengers began to stand up and retrieve their carry on luggage. A young lady in a snappy light blue NASA uniform appeared at the door and ushered the passengers into the orbiter terminal. They found seats in the waiting room. They were seated beside a large man. They assumed the man was to be a passenger on the same flight they were taking, and struck up a conversation with him.

“Hi, I am Tim Erkin and this is my wife Carla, are you also a new Mars Colony, Inc. employee?” “Yeah, I was just hired” said the man in a deep baritone voice that you would expect from a man of his size. “My name is Archibald Shrimp, but everybody just calls me Archy. I am from West Virginia, I signed on as a laborer but I am also a part time minister of the gospel. I was called for preachen bout eight years back. I been worken in the coal mines most of my life. I spect we gonna get to know each other pretty well in the next ten years.

They had a chance to become only briefly acquainted with Archy before the NASA hostess announced that they could now board and get their room assignments. The thirty five of them were lead through the air lock and into another waiting room, this time on the ship.

Carla remarked to Tim “That man we just met just does not seem like the kind of person that the company would hire, he talks like he is downright ignorant.” “That’s not the impression I got,” Tim responded. “I’ve been back in those hills touring the coal mines and that is the way they all talk.”

A junior ship's officer dressed in a blue jumpsuit, and wearing ensign's bars, started calling names from a roster. White clad attendants lead the passengers off one by one or in groups of two, to the assigned rooms that they would be calling home for the next two and a half months.

Tim and Carla were told that since they were a married couple they were entitled to a suite. Their Suite turned out to be an eight by fourteen foot room with a double bed, two folding chairs and a small round table. The floors were carpeted. There was a fairly large TV screen mounted on the wall in front of the bed. There was also a built in dresser and mirror. There was a four foot by five foot enclosure near the entrance that took up part of their space, it contained a shower, toilet basin and mirror. All in all pretty spartan but what did they expect on a space ship.

They had no more than put their carry on luggage on the bed when there was a knock at the door. It was the their steward who had shown them to their room. He introduced himself as Damian, their steward. He told them to let him know if they needed anything, not that he would get it for them but he would tell them how to get it. They could always reach him or the steward on duty through the intercom mounted on the wall beside the bed. “At the moment though,” he said, you are to go to The Company Room 812 where you will be issued your on board ID cards. They will be ready for you when you get there.”

Following Damian's directions they took the narrow stairway down three floors to the eighth floor where they located room 812. They received yellow ID cards with their picture on them. They were told they must wear these ID cards at all times. They later found out that yellow meant they were workers employed by Mars Colony, Inc. The nice young lady that issued them their cards ask if they had any questions. “Yeah, where is the dining room the class room and the bar.” asked Tim? “Here is a map of the parts of the ship that you are authorized access to. I am afraid that we refer to the dining room as the mess hall. The bar only serves soft drinks or coffee. It is called the 'Day Room' you will be going to different classrooms from time to time. They are all numbered on your map. You will see color coding on each floor, you are only authorized access to the top three floors, 8, 9, and 10. Enjoy your trip, these are the best accommodations that you will have in the next ten years.”

In their exploration of the top floors they found a nice Day Room with a small library, a mess hall that would seat about four hundred diners an adequately equipped gymnasium. They also located several locked classrooms. Peering through the doors revealed some strange paraphernalia inside. Many of them resembled what was probably a rendition of the Martian landscape.

Upon returning to their room Carla turned on the TV. They saw a schedule displayed on the screen. Breakfast was from 0600 to 0700, lunch from 1200 to 1300 and dinner from 1700 to 1800, meals would be served at no other hours. The time on the clock at their bedside indicated that it was already 1130, almost time for lunch. There was a button marked personal messages on the remote control so Carla gave that a try. Their names appeared on the TV screen accompanied by a message that said that they were both to appear at room 914 for orientation at 1330. There was a message for Carla that said she should report to the mess hall at 0400 for training. There was also a message for Tim. It said that he should report to room 865 at 0730 to begin training. They kinda chuckled and Carla said "Well so much for a long leisurely trip."

They arrived at the mess hall at 1200 sharp to find about one hundred people ahead of them in line. They noticed when they got up to the door that the diners were taking a plastic tray, stainless steel silverware and a paper napkin. Then by placing their tray on top of the glass sneeze guard and easing it forward they received a portion of everything offered. Once seated they noticed a selection of sauces along with salt and pepper on each table. The food they found to be institutional but adequate.

At the Orientation they learned that the ship which maintained artificial gravity had started with 85% Earth gravity. They all acknowledged that they had noticed the reduced gravity and were fascinated by it. "Here is how it is going to work" explained the Government speaker. "We start at 85% but that will diminish as the trip progresses. By the time we reach the two month mark of this journey we we will have the gravity down to thirty five percent. That is in order to get you accustomed to Mars gravity gradually so it won't be as much of a shock to your system when you actually arrive there. Prolonged exposure to a gravity of less than 1.0 which is the gravity off Earth will cause stress on your body. This need not be a problem, at least not while you are on Mars but it could be when you return to Earth. You could have dizziness, problems maintaining your balance, nausea and disorientation for several months after your return. There are things that we can do to minimize the effects living in low gravity. After this meeting you will be given a shot which will strengthen your bones and muscles, you will receive a stronger dose of that medication each month of your trip. You will continue to receive the shots monthly during your stay in reduced gravity, while on Mars and on your return voyage. You will continue to receive modified shots monthly for the first two years after your return to Earth. It is complicated but the human body tends to circulate blood differently in reduced gravity. The system you were born with was designed to function best at 1g but we have found that system can function just well at thirty five percent of 1g if the proper medication is administered on a regular basis. These shots will help prevent you from developing osteoporosis and muscle degeneration as well as adjusting your blood flow to and from your heart and brain. Missing the shots could result in serious medical consequences so be sure to get your shot monthly. The shots alone will not do it. You will be furnished with special vitamins that are to be taken daily. It will be necessary for

you to enter a special exercise room on Mars, and on this ship every day. These exercise rooms are equipped with artificial gravity and will increase gravity gradually by 50% during the hour that you are using the exercise equipment. You will do some high impact exercise like weight lifting and some low impact rapid movement exercise such as treadmill and bike riding at each session. You will need to do these exercises on a daily basis. If you shirk these exercises or don't give 100% you will be shortening your life expectancy considerably, particularly after your return to Earth. Perhaps some of you have already found the gym on this ship and thought, well that is a nice touch for the exercise nuts but it is far more important than that. The exercise is vital and necessary for your survival. Because of the gravity change that takes place exercise periods commence on the hour every hour so plan your day accordingly. You must slide your ID card when you start your exercise period. Anyone who goes 24 hours without exercising will be held accountable. Get used to it as you will be doing it every day for the next ten years, or for however long you remain in low gravity. Just so you will know the gravity on Mars is at thirty five percent. The lowest gravity that human beings can tolerate over an extended period of time is 33% so gravity is your enemy. Regular exercise, shots and vitamins are your friend."

"Next I would like to discuss the matter of time and date. The time that we use on the ship and the time that is currently being used on the planet is Greenwich mean time and the calendar is the ordinary Earth calendar that you have used all your life. We use Greenwich Mean time based on the 24 hour clock. We do this because an ordinary wrist watch can provide you with this information instantly. The 24 hour clock is also called military time. The United States military has used this 24 hour day for over two hundred years. Please never refer to AM or PM again when giving someone the time."

Since humans seldom go to the surface of Mars and when they do, it is for only one hour or less at a time, it is more or less irrelevant what time it is on Mars or what the date is. Scientists have worked out a Martian clock and calendar. The display also gives the current temperature and wind speed. If you are planning work on the surface it will be necessary to consult the Martian clock and calendar that has been posted in several places in the Government cavern and adjacent to each elevator. You can continue by the same time and date that you have always used. It is important that humans only go out on the surface when the weather is warmest and the light is best.

"It is inevitable that a certain amount of work will have to be performed on the surface but it is important that you know that you can not even tolerate the surface for one second without suffering serious health consequences. Fortunately we have developed Mars suits which are similar to space suits in appearance but quite different in many ways. They are specially equipped to handle the outdoor conditions on the planet. While wearing one of these suits in the middle of the day a man can work on the surface for up to an hour under optimum conditions but in no circumstance is it safe to work outdoors in a Mars suit for more than an hour at a time without coming in and removing the suit for

an hour before venturing out again. Twice a year there are winds that blow across the surface at speeds ranging from two hundred fifty to four hundred miles per hour. If you are caught in one of these winds you will be found dead if you are ever found at all and it won't matter whether you are wearing a Mars Suit or not. So no one is allowed on the surface to do any kind of work without obtaining a slip from the project safety engineer. The average temperature on the surface of the planet is -55 degrees Fahrenheit. The warmest temperature ever recorded on the surface of the planet was eighty degrees. Mice introduced to the surface for even three seconds just explode. Don't think that you can venture out through an air lock even for a second it would probably be fatal. Surface conditions are constantly monitored by the project safety engineer who has been thoroughly schooled in determining when outside work can safely be performed ”

“You are each being given a vitamin box with the date on each compartment. You will be given a new box a few days before the end of each month. You absolutely must take that days vitamins every morning after breakfast. It may be desirable to take vitamin supplements on Earth but on Mars it can mean the difference between life and death. If you find that you have missed a day then report immediately to sick bay for a shot. It is vitally important on Mars that you properly maintain a human body that was never intended to be there in the first place. We don't want you to feel any trepidation over the things I have just told you. If you go by the rules you will be fine. You will be able to return to Earth safe and sound.”

“Now for an interesting little demonstration of artificial gravity. My assistant on the platform above me is going to drop a rubber ball at my feet. Go ahead and drop the ball Fred.” The ball hit right in front of the speaker but instead of bouncing back straight up to him it careened off into the audience, coming down near the back of the room where a woman prepared to catch it. Instead of her catching it the ball hit the man two seats down from her in the chest. He picked it up and the speaker said, “great, now throw the ball back to me.” When the man threw the ball he was off by about 20 feet. “What does this demonstration tell us? We are in artificial gravity in a relatively small enclosure. Even though this ship is as wide as a football field and four times as long it is still relatively small as space objects go. Artificial gravity behaves differently from planetary gravity. The larger the object the less difference there is between artificial and planetary gravity. On Mars which is a planet that generates it's own gravity the ball would behave more like it would on the Earth but not exactly. You will eventually adapt to the differences without realizing it but at first it will seem strange to you because by that time you will have become accustomed to the way gravity behaves on this ship. This difference could cause some nausea and equilibrium problems in some people but it is not serious. It is a temporary condition, it will pass. It is caused by the inner ear trying to adjust to the new environment. If it causes you too much distress go to sick bay. They will issue you some medication that may help.”

“Are there any questions at this time?” “Yes,” a woman in the audience

asked. "I thought it took six months to reach Mars even when Mars was at it's closest point to Earth, how is it that this voyage is going to take only two and a half months?" "The six months and more voyages were based on launching a vehicle into space and then shutting down the engines and allowing the space vehicle to continue on to its destination at the speed that it had attained when the engines were shut down. On this craft the engines are never shut down because the ship is powered by nuclear energy. We will continue to accelerate for about half the journey then will decelerate for the second half. That reduces the travel time greatly. At the maximum that we will reach on this trip the ship will be traveling at about one hundred sixty seven million miles per hour, about one fourth the speed of light. Mars is much too close to Earth to go much faster than that. We would run the risk of overshooting the planet entirely and leaving the solar system. A far more sophisticated ship than this is presently under construction that will exceed the speed of light but at the speed of light it would still take approximately four and a half years to reach the next solar system known as Alpha Centauri."

"(Alpha Centauri (α Cen / α Centauri) is the brightest star system in the southern constellation of Centaurus. Although it appears as a single point to the naked eye, Alpha Centauri is actually a system of three stars, one of which is the fourth brightest star in the night sky. Alpha Centauri is famous in the Southern Hemisphere as the outermost "pointer" to the Southern Cross, but it is too far south to be visible in most of the northern hemisphere. The two brightest components of the system are too close to be resolved as separate stars by the naked eye and so are perceived as a single source of light with a total visual magnitude of about -0.27 (brighter than the third brightest star in the night sky, Arcturus)."

"Alpha Centauri is the closest star system outside our own solar system, being 4.39 light-years distant, about 25.8 trillion miles. Proxima Centauri, often regarded as part of the system, is 4.26 light-years distant. Alpha and Beta Centauri are the second closest pair of first magnitude stars as seen from the Earth, and due to the effects of proper motion, they will become the closest pair around 2166, overtaking Acrux and Becrux".

"There being no more questions this orientation is adjourned. Be sure to pick up your vitamins on the way out, also be sure to visit the gym for your workout, on the hour, at some point that fits your schedule during each 24 hour cycle."

The orientation lasted just over an hour. "Well said Carla I guess I should take my vitamins for star date whatever it is." "No, you are supposed to take those after breakfast, remember, we should start tomorrow." After their workout and a lite dinner they returned to their room. By this time they had forgotten all about needing a nap, besides they would have to go to bed early if Carla was to be in the kitchen at 0400 to begin training.

"Training, that is a laugh, why don't they just call it what it is KP duty?" "Oh, well, Carla I might luck out and they may teach me how to nail 2x4's

together.” They had intended to check out the coffee bar and day room but opted to watch a movie on TV, then turn in for the night. They found that could just select “Movie” on their remote control then a list of over three hundred movies were available, including the latest releases that were just now reaching the box office. It didn’t matter which movie they selected, they fell asleep almost as soon as it started.

July 8, 2107: Carla was kind of amazed when she arrived at the kitchen the next morning. She was directed to a classroom adjacent to the kitchen where she could watch what was going on in the kitchen through a large window. Within five minutes the room attracted twelve other students who began to get acquainted with one another. This was important to her because she knew that these were the people she would be working with for the next ten years of her life. Carla introduced herself to a couple of the others but mostly just listened as one after the other talked about their backgrounds in food service and how they had come to be here. She caught a few names but didn’t concentrate on doing so because she would know each of them very well in due time.

About 0410 a man in cook’s whites entered the room, he was a medium built man of about 40 “Good Morning Students, my name is Don Morino. I am a member of the ship’s crew not a member of the kitchen staff. My job is to provide you with the necessary instruction to enable you to hit the ground running when you arrive at your duty station.” The first thing he did was to introduce one of the students as their new mess boss. The woman’s name was Hilda Gorman, she would be in charge of the kitchen operation for the employees of Mars Colony, Inc. “Hilda will during this voyage select four of you to be head cooks. She will also select three crews of three cooks each from the rest of you. So Hilda would you like to address your crew before we get started?” “I don’t have much to say at this time but the other students should know that for the last nine years I have been employed in the kitchen of a major hospital. I am married. My husband has also been hired by The Company because of his background as a hydrological engineer for mining operations throughout the Northeast. We obviously have no children or we wouldn’t be here. I have a BA degree as a dietitian from Arver college. I went to work for Central State Hospital in Trenton right out of college. I worked my way up from the bottom. When I left to take this job, I was in charge of the entire food service program of the hospital. I am pretty well qualified to have the position that I hold and I hope that I can adapt to the conditions we find on Mars, I hope we all can.”

When Hilda sat down Don continued “I guess I owe you an apology, you are going to have some problems when you first arrive on station. Your kitchen and dining room is in the hold of this ship, it will have to be installed after you arrive. Until then you will be using an army field kitchen that is also in the hold of this ship but can be set up quickly. I am having the field kitchen brought up here one piece at a time so I can teach you how to use each item to feed three hundred hungry people. Your refrigerator and freezer space will be shared with

the Government kitchen that is presently operating. Their mess officer has agreed to accommodate you to the best of his ability but expect some problems as they don't have that much refrigeration space to spare. You will have to serve a lot of canned and dehydrated food until your facilities are functioning." "The on board food service crew is operating short handed because they will expect you people to help them with serving and kitchen clean-up for every meal until we arrive at Mars Station. With that Don lead them to an adjoining locker room. Please give my assistant your size. She will issue you a set of whites which you should put on as soon as you receive them. There are dressing rooms in the rear of the locker room. Your lockers already have your name on them. My assistant will provide you with the combination to your locker. Once you are satisfied that the whites are the right size go up and draw two more sets. Put them, along with your regular clothes, into your locker.

The whole crew shortly found themselves serving breakfast to the passengers. Once everyone had been served they filled their own trays and found a seat. Carla found Tim seated with Archibald Shrimp and two other men she didn't know. They introduced themselves quickly because they were already eating their breakfast. They had been served scrambled eggs, corned beef hash, biscuits and gravy and some sliced fresh fruit. "Enjoy your fresh fruit, once it is gone you probably won't see any fresh fruit for years to come,." said the man who had introduced himself as Jack Overmeyer.

The clean up didn't take long and by the time Carla returned to the class room there was an assortment of cooking appliances at the front of the room. Don Morino spent the rest of the morning until lunch explaining the proper use of the equipment. It seemed to Carla that it wouldn't be half bad using this equipment on a temporary basis as everything seemed pretty well thought out. Lunch was pretty much a repeat of the breakfast scene. After the cleanup they were given the afternoon off but told to show up to serve dinner and help with the clean up again. For the rest of the journey Carla pretty much followed the same routine. Classes covered all the basic kitchen and cooking skills, food preservation, sanitation and everything else that most of them were already quite familiar with. There were a few new things to be aware of, mostly those concerned becoming accustomed to cooking in low gravity. They didn't seem particularly complicated, just different, they were techniques that would come naturally after a few days. Carla found for example that two women could easily carry a 20 gallon pot of liquid that would weigh about 180 lbs on Earth but on Mars would only weigh only thirty five percent of that much or about 56 lbs. If you flipped eggs in a pan to turn them over they might soar to five feet before they started their decent and then they probably wouldn't come down in the pan. Until their kitchen was completed on Mars they would be getting their water in five gallon jugs but not a problem she could lift one easily by herself, it would weigh 40 lbs on Earth but only weighed 14 lbs on Mars. There were lots of other things like that.

She chose the early afternoon to go to the gym. The exercises were about what she had expected but they seemed a little easier to do. Gravity was

still at 85% on the ship.

Tim's training started after breakfast. Tim had an hour or so before he had to report to start his training. He found the right room and arrived about five minutes before 0730. There were over two hundred people in the room when the instructor arrived promptly at 0730. He was dressed from head to foot in a Mars Suit. There was a microphone in the helmet and a speaker that amplified his words. There was also a speaker for each ear. His hearing was very sensitive while wearing the suit. He told them that if turned his volume up to max he could hear a pin drop one hundred yards away. He spent the next hour explaining the features of the Mars suit as he removed parts of it from his person. This suit is unlike a space suit in a number of ways, he told them because a space suit was designed to wear in a weightless environment, whereas the Mars suit was designed to protect the wearer from the cold, the UV rays and from the atmosphere of Mars. The boots were different and the fabric was much tougher and harder to penetrate because the wearer would be doing hard physical labor while wearing the suit. The suit air sealed around the neck so even if the suit were compromised the helmet would remain intact and the wearer might have time to patch the hole.

Humans working on the surface of the planet always work in pairs. We always send two people to do one persons job. The iron rule of survival on the surface is NEVER GO OUTSIDE ALONE. not for any reason, under any circumstance ever. There are no exceptions to that rule.

"My name is Ashton Thompson, I am the head instructor for the Company. I will not be going to the planet with you but I was a Captain with the Army Corps of Engineers that constructed the first habitat on Mars I have spent more time on the surface of the planet than almost anyone else. The other instructors were also there with the Corps. You should pay very close attention to everything they teach you because it is your life that depends on it."

"You will only be asked or allowed to work on the surface for an hour at a time. That does not Include working in the caverns that have yet to be pressurized where you can work up to four hours at a time while wearing the Mars suit. The caverns on Mars are full of fissures that lead to the surface. Until all of the fissures have been sealed and the cavern pressurized you must work in a Mars suit. Once the cavern has been pressurized and heated and atmosphere introduced you can work in an ordinary jump suit. "

"Most of the work you will be doing in addition to what I have just described is leveling the floors and building the million and one things that people need to carry on their lives. Your present priorities will be to finish setting up The Company cavern to accommodate the three hundred people that The Company is sending on this ship. The cavern has already been sealed and pressurized and the floor leveled but your first two priorities must be to complete the dining room and kitchen and to complete instillation of the bathroom facilities. Installation of the thermo electric generator for power and the reverse osmoses system for water purification are items that are also very

high on the list of priorities.”

The the thermo electric generator equipment for that project is on board this ship. It is essential that we obtain our power and heat from some source other than diesel generators.” The sooner accomplish these high priority objectives the more comfortable you will be and the happier the Company will be.“

“Once these things are completed then you will be sealing a large cavern that we have found that is withing tunneling distance from the cavern that The Company will be occupying. Once that cavern is completed and powered by geothermal energy The Company will be sending in 3,000 more employees to complete the main cavern which is about the size of the State of Rhode Island. Mars Colony, Inc and the United States Government are very aggressive in pursuit of the goal of occupying the large cavern.

In anticipation of taming that large cavern the company figures they will need three thousand more employees. Since we are only capable of transporting about one thousand two hundred workers per year every flight from now on will be loaded to capacity. Once the large cavern is completed and settlers begin to arrive more and larger ships will be required to keep them supplied. Two more space craft are presently under construction. One which will be dubbed Mars Runner is twice as large and twice as fast as this ship. The other ship, yet unnamed will be ten times the size of this ship. It will be capable of speeds greater than the speed of light. It could be capable of journeys beyond the solar system into deep space.

All of the work on Mars will never be done just as all the work on Earth will never be done but once the large cavern is finished and populated you can expect to see cities with business and shopping malls just as you see now on Earth. Land will be bought and sold just as on Earth. There will be an independent Government elected by the people. Mars will be a fully functioning planet.” Since this is all being done by the United States the new settlements will be a part of the United States.

“That in a nutshell is our plan and your mission.” Our goal beyond my lifetime is to convert the atmosphere of Mars to be more Earth like which would involve rotating the planet faster which would Increase the gravity and enable the planet to retain an atmosphere which we could introduce. At that future time we would have to figure out how to produce an ozone layer on Mars that would shield the surface from deadly radiation. Perhaps a friendly atmosphere would generate it's own ozone layer. We know that those things are possible but it will probably be another hundred years or more before they are realized. One thing for certain once this planet is colonized with the technology that we now have the scientists will be working hard to solve those bigger problems.

“We have prepared sixty lessons and have allowed six to eight hours for each lesson. You will be broken up into fifteen groups of eleven or twelve students in each group and will take one lesson per day. The lessons all have

to do with using the equipment, how to do the necessary jobs, safety and the like. We have 15 instructors so by the time you reach Mars you should pretty much know what to do and how to do it no matter what your previous background has been. Most of you have a few years experience in the building trades and that will be a desirable background to build on. It is just that on Mars you will be using different materials and different tools. We have posted your names on the cork board at the back of the room. There are 20 copies for each team so take a copy of the one for your team. It will tell you what room to report to and what time to be there for the entire course.”

“You may have the rest of the day off to get acquainted with each other, you will be working together for a long time, explore the part of the ship where you have authorization and to set aside one hour for exercising in the gym.”

“Incidentally, if you didn't know there is a restaurant that serves a first class dinner with two drinks or two glasses of wine. You can order anything you want from the menu, they are open from 1700 to 2200 every evening. The food and service are the very best. The restaurant is run by a contract vendor. The price is a little steep by Earth standards, \$200.00 per person but that covers everything, even the gratuity. You will find the restaurant behind an unmarked door in room 888. Reservations are required, just ask your room steward to set them up for you. You will not be allowed to eat there more than once a week. You may pay by sliding your ID card and the price will be deducted from your next pay check. You might want to have one more meal in a top notch restaurant before you disembark. This will probably be your last opportunity for ten years.”

There was an extended question and answer period but the meeting let out by 1000 hours. Tim found his name on the list for group 11. He was pleased to see the name Archibald Shrimp on the same list. It was easy to find Archy, then together they watched for others taking a copy of list 11. They caught five of them. Someone suggested they go to the coffee shop and get acquainted. The coffee shop served all beverages for one dollar except the special coffee's which were \$5.00. Once again you could slide your ID card and have the amount deducted from wages. As it turned out the coffee shop was run by the same company that ran the restaurant.

There was one girl in the group but the other six were all guys. The girl was black and that didn't make Archy unhappy at all. She turned out to be Gladys Hayes and was a high rise construction worker from New York City, yes a beam walker. Albert Gonzalez was a tile layer from Albuquerque, John Prince, had worked for a paving contractor in Spokane, Alan Nagoyuk, had worked as a construction foreman in Fairbanks. All but John took a dollar cup of coffee, John opted for a cafe-lata for \$5.00, “What the hell, I am going to be a millionaire,” he said. They found a large round table and began to tell each other their life stories.

Albert said that aside from his job laying tile his hobby had been cave exploration, he had been a Speleological Society member for eight years and

had explored caves all over North America. "My friends of course refer to me as the cave man."

Alan said that he had been a member of the Alaska, National Guard and had instructed survivalist training in the guard.

John Prince said "I started playing baseball in little league and have played all my life, I even made a minor league roster for a year before I figured out that I just did not have what it takes to make it in the majors so I just play baseball now as a hobby." Tim noted "You won't be playing any baseball on Mars, I'm afraid because baseball won't work there, a pitcher could throw a baseball hard enough to kill a man on Mars and a sharp line drive could also be lethal, a man just can't handle a baseball coming at him three hundred miles per hour. Also worthy of mention here is that football, basketball and soccer won't work on Mars either. A quarterback could pass a ball two hundred yards and could throw it hard enough to kill his receiver. Basketball might sort of work but everyone in the game could shoot from anywhere on the court with ease but probably could only make a slam dunk because the ball would go awry. Dribbling wouldn't work very well either nor would passing. Soccer, hockey, all Earth sports are out on Mars, tennis, that's out too, the projectile just moves too fast and has lethal potential with every play. We are just going to have to invent new sports, maybe using oversize Nerf balls." "I never thought of it that way but I guess you are right, we will just have to invent our own new sports and start from scratch." said Archy. "Cave exploration and arctic survival could be useful skills though."

After their chat they all showed up for their exercise class in the gym, it wouldn't ordinarily have been conducted as a class but since they were all new at it the instructor lead them all through the exercise routine for the first time together. They learned that they had to move slow in low gravity and set the machines for high resistance, if they moved fast they could hurt themselves. If they set the machines for ordinary gravity they wouldn't feel any resistance at all. Even doing calisthenics you have to move slowly the instructor told them. Right now that doesn't apply because we are presently at 82% gravity but on Mars it will be very true.

July 11, 2107: Tim and the others had started their training, Carla had continued her training and they sort of fell into a routine. After her first day of starting at 0400 hours they had changed Carla's reporting hour to 0530 so she would be there in time to help in getting the breakfast line set up to serve breakfast. Her classes ran from 0700 to 1130 when she helped with lunch then she was off until it was time to set up for dinner at 1630, she was all through for the day at 2000 hours. Tim attended classes from 0800 to 1200 then from 1300 until they had finished with the lesson plan for the day. They began to make new acquaintances and friends within the group that would remain on Mars with for years to come. Everyone had taken a liking to Hilda, she was real people.

One couple that they spent a lot of time with were Juan and Lupe Rivera, who were also recruited as a couple. Juan was an MD with a specialty Space

Medicine. Lupe was a Registered Nurse Practitioner, specializing in family health care. Both of them had degrees from UCLA Medical School in Los Angeles. They had both been working at L.A. County General when they were selected for this job. Juan had made several journey's into space for NASA as resident physician. "I'll bet that The Company paid dearly to get you two," Tim remarked shortly after they had met. "Not as much as you might imagine," Juan responded, "I guess it was because we wanted this gig so badly, we were willing to sell out cheap." Juan told them that there were at least three other physicians and half a dozen other nurses on this flight that The Company had hired to care for their employees. "We have a whole clinic in the hold of this ship. I am hoping that you construction boys give us a priority when it comes to setting up our clinic." "I don't have anything to say about priorities" said Tim "but I will sure put in a good word for you, and on my day off I could help with some of the setup, Just think Juan, if they put it to a vote most of these folks would want the kitchen and dining room set up first. Only the sick ones would want the clinic. Besides the Government already has their clinic set up and you could work out of there until your clinic is up and running." "I heard that they don't even have a roof over their head at that clinic", said Juan. "Nobody on Mars has a roof over their head Juan, just walls, doors and windows, that's the way buildings go up on Mars, they are all indoors, anyway, so who needs a roof? I hear that most of the people there now just put up four walls and put their air mattress and bedding inside. They each have a wire framed sheet plastic set of drawers to keep their clothing and other belongings in. That is about all they have for now. We have light weight furniture on board for each person and couple and air mattresses for all the new employees but it is up to them to make their own walls. This life style is going to take some getting used to. I have no idea what you pictured as a clinic but it won't be anything like what you imagine. I know that some of us in construction will be making Martian cement blocks and putting up walls for people. We have some plastic sheeting in the hold that folks will be able to use for windows but so far no one has figured out how to make doors. So far the best idea has been to make the walls so you have to enter then turn left and take about three steps before you can turn right and actually enter the room. Remember there is no need for protection from the weather which is always perfect and there are no personal lamps to light a room. Most people just have reading lamps and flash lights to see things after lights out in the caverns. They turn the lights out every night at 2200 and turn them back on at 0600. Public buildings like the kitchen and your clinic will have auxiliary lighting that can be turned on or off at any hour." "Where did you hear all this? Tim." Classes, I have been going to class every day for the last ten days. I have been learning a lot about the living conditions that we will find there."

July 20, 2107: About 1730 they heard a knock on their door, it was Juan and Lupe, "You guys ready yet?" Tim and Carla were dressed in their best civilian clothes, well actually their only civilian clothes, Tim had on his sports coat, shirt tie and slacks and civilian shoes, Carla was wearing her dress. These were the clothes they were wearing when they left Earth, was it just two

weeks ago, it seemed like months. Tim said, "You guys shouldn't be doing this, buying our dinner at those prices." "Don't give it a thought, Tim, you guys signed up for this job for the chance to become millionaires but I was born into money. Those prices don't even seem high to me, we frequently spent that amount for a dinner in a good restaurant in L.A.." Juan had made their reservations at the restaurant and just informed Tim and Carla that they were going to dinner as his guest the day before.

When they entered through the unmarked door it was like stepping into a different world. There were waiters in tuxedos and white table cloths. The head waiter seated them at a table for four to one side of the room. Their steaks were grilled to perfection and came with all the trimmings. They ate and talked and shared the two bottles of wine they were entitled to. "I wonder why they are so tight with the booze on this ship", asked Tim. "It is probably because not enough is known about the effects of alcohol consumption in low gravity. We have a hard enough time standing up and not falling down in artificial gravity and alcohol could interact with your shots or some of those potent vitamins we take every day. The alcohol could intensify some vitamins that are already at maximum safe dosage levels and it could reduce the effects of other vitamins. There is really so little known that The Company figures it would be safe enough to have two drinks a week but they don't want to be held liable in a law suit if anyone suffers ill effects from their shots or vitamins in combination with the alcohol. I intend to look into the matter in depth in my spare time once we are on Mars." "In the meantime what do they have you doing on this flight, Juan, while the rest of us are attending classes?" "Since I am the only Dr. on board with a degree in space medicine and since I have worked in space on several occasions I am teaching classes on low gravity medicine to the other Dr's." "I want you as our primary health care provider when we get to Mars, Juan" said Carla. "Not to be, Carla, I will not have a family practice on Mars, in fact I have never had a family practice anywhere, my specialty is Space Medicine which I am now required to convert over to low gravity medicine. Lupe is my primary and I suggest you make your deal with her. What I will be doing is taking on cases that are related to our unique environmental issues." "OK, then Lupe would you consider being our primary health care provider?" "I'd love to Carla, I'll sign you up as soon as we arrive and I begin practice." That evening Tim enjoyed an excellent USDA prime steak and Carla opted for a Maine Lobster tail. It was not difficult for them to hit upon interesting topics for conversation during the meal. They downed their last bit of wine and called it an evening.

Juan continued to dine at the restaurant as often as he was allowed to but had different dinner guests on each occasion. The couples would meet periodically to shoot the breeze and update Juan on what was being taught in the Mars construction classes. Tim, had learned how to make Mars cement which was basically just mud made from a certain soil type found in the caverns mixed with surface sand. They dried it on the surface of the planet, they seemed to cure better and quicker when exposed to the UV rays on the

surface. The cement blocks were then carried back inside. They were as hard as concrete and could be used in many ways. Some were used for building walls to give people the feeling of privacy. Because a man could easily lift heavier weights on Mars the standard size for cement blocks was the same length as those made on Earth but twice the width. By using these larger blocks steel reinforcement was unnecessary for walls up to eight feet. Cement could be poured indoors but it took it several days to cure. When a floor was leveled in a cavern it was first leveled with dirt then covered with the blocks, it made for very attractive floors. It was a standard practice to add color to the blocks when the cement was being mixed. Blocks were manufactured in eight standard colors. The different colors served to break up the starkness of the caverns, that way everyone's house did not look identical to everyone else's house. They were even using the cement to make furniture. You could form a chair out of the cement then put inflatable cushions on the seat and the back, it could be quite comfortable and attractive when using contrasting or harmonizing colors.. Juan was interested in hearing all the things that Tim was learning in his daily classes.

Tim, Carla and the rest continued with their daily routine for the next two months. Carla no longer had to attend classes but was doing some of the food preparation in the kitchen and still serving and helping with the cleanup. Tim had finished his course and knew all the people on list 11 pretty well. They all seemed eager to learn all they could about each other and about the planet that would be their home. The instructors all seemed friendly and competent. They were speaking from first hand experience when they talked about living and working on the planet surface and in the caverns. The instructors liked their jobs because they earned excellent money and had lots of time off on the return trips to Earth. Most of them were already too old to be allowed to work on Mars again. Tim suggested to Carla that maybe they could be instructors on flights out to Mars after they had finished their stint working there. Carla said "Yeah, but they would have to hire both of us."

CHAPTER - Tim and Carla arrive on Mars

September 28, 2107: Mars now loomed bright as they looked out through the port hole in their stateroom. It was mysterious and fascinating, they sat and stared at it for hours. They were notified by Damien their room steward to be prepared to disembark at 0800 the next morning. The Mars Orbiter was still not in view but they knew it was out there and the Captain was sure to find it.

They were awakened by a loud clanking sound at 0345 They peered out their porthole and could see nothing but the planet rotating below them. It was an eerie feeling, like they were just hanging in space. Carla noted that the planet really was Red. Carla went to work at her regular time but was told that

all she had to do was serve at 0600 and they would handle the clean up. After breakfast they returned to their stateroom then went out and wandered in the hall. They had never seen the hall that crowded, everyone was out wandering. They were allowed to keep their work clothes which is what they were told to wear. Their meager luggage was turned over to the baggage crew to be off loaded to the orbiter. They were scheduled for 0800 departure. The Shuttle Craft which was much like the one that had carried them Las Vegas to the Earth Orbiter would be making round trips for the next week. When they boarded the Shuttle they noticed that it was designed more to ferry cargo than people. There were sixty people at a time loaded on to the Shuttle, Tim guessed that the others would have to wait for the Shuttle to deliver them to the surface then come back for more. They took a seat on a bench along one wall of the Shuttle. The Shuttle was equipped to handle 15 passengers along each wall and thirty more in the center sitting back to back. They located their seat belts and strapped themselves down. As they broke the connection and eased away from the orbiter they noticed another Shuttle arriving from the surface. The reentry flight took just over an hour. It was not scary at all, the Shuttle just glided into the hostile atmosphere and descended smoothly to the surface.

On the way to the surface the passengers got a good look at the observatory. It was situated about two hundred yards from the freight elevator at the end of the runway. They also saw the giant radio telescope dishes mounted on the surrounding hills. They landed on a long smooth runway and taxied to a small cement building adjacent to a platform that was apparently large freight elevator. Twenty feet above the freight elevator was another platform that served as air lock when the freight platform was in the cavern.

The airlock was connected to the shuttle and they disembarked into the elevator then the airlock was closed. Both the elevator and the Shuttle were pressurized. They stood as the elevator descended the equivalent of twenty five floors and came to an abrupt stop. The door slid smoothly open and they stepped out into a Mars cavern. Two hundred yards from where they had stepped off the elevator Tim noticed another elevator shaft running up the far wall and continuing on through the cavern ceiling.

Tim and Carla took a deep breath, "Do you smell the stench, Carla?" "Yes, sure I do but they say you won't notice it after a while thank goodness." "To me it smells like a sewer," Tim added.

The lighting was a little dimmer than expected, otherwise, thanks to his classes everything seemed as he had imagined it. They were greeted by both a Government representative and a Company Executive. The Government man appropriately declared, "Welcome to Mars, My name is Walter Potts, I am the project director and this is Thelma Potts, the Mars Colony, Inc. manager, she is also my wife of seventeen years. We both came up here with the Corps. Of Engineers twelve years ago, when we had to live in our Mars suits at all times. We are the oldest living residents of Mars and we are only in our forties. We are over age for being here but our duties require little physical exertion, you

young folks are here to do the hard work. Do you want to add anything Thelma?" "No I just want to welcome these nice people to Mars and I hope to get to know you all personally as time goes by. I would like to tell you folks right now that things are different here." As timing would have it just as Thelma said that a chicken flew by over their heads. "See what I mean," she added. "Don't worry about the chickens, they come and go as they please but always go home to roost, eat and to lay their eggs."

"Do any of you have any questions that you would like to ask us now?" "Yes, I do, my name is John Prince, I played a lot of baseball up until the time I took this job. It never occurred to me that Earth sports just would not work on Mars, my question is are there any sports that you have here that we had on Earth?" True there are a lot of sports that can not be played in low gravity but there are several that do work and we play them, these include chipping a golf ball and putting, croquet, shuffle board and horseshoe pitching. There are some modifications to all of these sports to take low gravity into account but they all work and are interesting to play."

"There is one more but it really isn't a sport, it's low stakes poker, which is a very popular pass time. We started out playing no limit games but things got out of hand because everyone here has so much money. Some people were getting hurt badly at no limit poker so we set a five dollar limit on any bet. It is enforced on the honor system but I have heard that higher stakes games still go on. If caught playing in a game that allows higher stakes you could be facing a \$5,000.00 fine. If anyone was actually fined the money would go into the recreation fund."

"Now if you will please follow me and I will take you on a brief tour of the facility," said Walter. The Government facility was quite large, about 320 acres, or about the size of six tournament golf courses on Earth. There were several hundred cement buildings, of various bright colors, some bore signs declaring their purpose, others just numbers, "Look at that Carla they even have street addresses." "Watch out!" Carla yelled and yanked Tim aside, as a man in his thirties skipped by. "That is what I have been interested in seeing and trying as soon as we got here," Tim said, "We learned about it in class and I can't wait to find my own gate." As they looked at the people moving about in the clearing they noticed that no one walked as people did on Earth. They each seemed to have developed their own way of moving along. Some skipped, some hopped like a rabbit. The kangaroo gate seemed to be popular but they were all moving about as fast as an athlete could run on Earth. "I meant to tell you folks about getting around down here, it is different than on Earth there are things you can do here that you can't do there and visa versa. Here it is easy to jump up but you must be careful not to injure yourself when you come down. My advise is to just cautiously experiment with moving around until you find out just what your capabilities are and what works for you. If you jump down off of something you don't land as hard as you would on Earth but it is easy to fall into the trap of thinking you can jump down from three times the height that you could on Earth and you can but we do get a lot of serious sprains and broken bones that way."

Here you can jump high enough to be pretty certain that you are going to injure yourself on your landing. The human body was designed to move around safely in one g of gravity. Here things are different, all things considered I think I like this atmosphere and gravity better but it takes some getting used to. For the first month you are liable to accumulate quite a few black and blue marks from bumping objects too hard. Watch how other people, who have been here a while are moving and then try some of the maneuvers you see them performing. Whatever you do don't hit anyone else and don't try any Martial Arts moves on anyone else. Serious injury is inevitable if you do. Just be very cautious while you acclimate and you will do just fine."

"Over here we have our gym, I am told that you were introduced to the gym routine while you were on the ship. I just can't over emphasize the importance of your daily workout, taking the vitamins you are issued daily and getting your shot monthly for as long you remain in low gravity. The gym that we have here is the same as the gym you were working out in while you were on the ship. Our classes start every hour on the hour from 0600 through 1800. You will have to sign in. If you miss a day of taking your vitamin supplements or doing your exercises then it will be necessary for you to seek medical attention."

One member of the group asked "I was told that you had a cavern for The Company employees all sealed and pressurized, could you show us our new home?" "Sure just follow me and try to keep up, I'll go slow so as not to run away from you."

They came to a tunnel entrance on the right side of the Government cavern. The tunnel was approximately fifteen feet high and twenty feet wide. They followed it for about fifty yards into a three times the size of the government cavern. "I want you folks to know that everyone at this station has been working their buns off getting this place ready for you. We even leveled your floor which I didn't think we could get done but we did."

The Government handles the administration of this facility and the research but Mars Colony, Inc. is the prime contractor. The Company is responsible for facilities management. If there is any plumbing or wiring or building to be done you are the ones who will carry out the tasks. You will be responsible for facility development and maintenance. The Government takes care of the atmosphere, I am sure you have already been briefed on your responsibilities and project objectives. The Company plans to send as many new employees as possible for the next three years. I am sorry that we were unable to do more for you but we did all we could. The Company had only one crew here until your ship docked. I think Thelma has some plans drawn up for what will go where in this cavern but they are not written in stone and certainly subject to your input."

The lighting in the empty cavern was very dim but you could make out all of the walls. The nice thing Tim Noticed was that there was a small river or stream, that ranged from fifteen to twenty feet wide, that meandered through the cavern dividing the front two thirds of the cavern from the back third. There

was even a water fall where the stream entered. It flowed into a small lake that covered about ten acres. The river ran out of the far side of the lake for about ninety feet before disappearing through the far wall.

Carla commented, "I am sure glad the ceilings on these caverns are so high it keeps me from feeling claustrophobic. That is something I was worried about." Walter overheard Carla's remark and responded, "The average ceiling height in these two caverns is 254 feet. The highest point is 412 feet and the lowest 196 feet," just for your information."

Tim noticed that the water coming down the falls was liquid but along the edges of the stream there was a two inch thick crust of ice and there was a layer of ice about one inch thick on the surface of the lake that covered about five feet out, around the bank. "Why is there ice in the lake and river but not on the falls and the river above the falls," Tim asked Walter. "I asked that very question of one of the geologists, Tim and he told me that the water above the falls is only 31 degrees but because it is in an unpressurized atmosphere it remains a liquid, once it enters this pressurized cavern it starts to solidify. If we don't do something to warm this water, at least a little we will end up with an ice skating rink instead of a stream and a lake in a few weeks. decreasing the pressure raises the freezing point of water. That is why the water in the unpressurized river was below 32 degrees but was not frozen when it entered the cavern but began to freeze once it was exposed to this pressurized environment. "That is interesting, I thought water always froze at 32 degrees."

Note that we have installed a concrete plug at the river entrance and another at the river exit. You can see that water flows beneath the plug, that is so our precious atmosphere does not escape."

"By the way how deep is the stream but more importantly how deep is the lake?" "The stream is pretty shallow, only six foot at it's deepest point but this lake is twenty foot at it's deepest point. The engineers tell me that it would be easy to make the lake larger or smaller depending on our needs.

"That is a beautiful little stream but the water is very cold. I'm afraid we won't be able to go swimming until we have geothermal heat installed. We hope to, one day, be able to raise catfish in the lake as a food source. The water is just a little brackish but very usable once you filter it through a reverse osmosis system. Do not however drink it or bathe in it until it is filtered. We have done so with no ill effects but it is taking a chance, we don't know where it has been. "We do know that it contains unknown strains of bacteria and algae. What we have tested is harmless but new strains of bacteria keep appearing.

There are Martian fish that occasionally seen swimming through. Some of the fish are edible but they are like mushrooms, some are harmless and some are lethal. One of your early projects will be to install a fish trap below the falls to catch any fish that enter the cavern. New varieties of fish keep showing up also, so it is best that you do not touch any of them, and certainly don't eat any of them until we know more about them. Once we can positively identify

the edible ones we could begin raising them as a food source, the ones we have dissected are pretty bony and don't appear to have much meat on them. It might be better to bring fish in from Earth and try raising them but first we have to prepare the ponds for them. Probably the next ship to arrive will carry some fresh water fish, some salt water fish and fish food. I sure hope so, our diet here is a little monotonous. Fish and Chips would sure be a welcome improvement."

"For the moment your new arrivals will be issued some basic necessities and invited to put your air mattresses anywhere you can find room. We are going to offer meals at our mess hall doubling the hours for all three meals. Your kitchen staff will work with the present staff. Until your field kitchen is set up we won't have enough cooking capacity to offer more than one hot dish per meal, so get ready to eat some cold cuts for a couple days."

Their hosts then lead them back through the tunnel to the Government cavern where Thelma pointed out the supply building. She instructed them to return to this building later in the day for their necessities. Each of them would be issued an air mattress and a blanket. Hopefully tomorrow we will have the rest of your equipment available but some of it you may have to wait a week to get as it will take that long to unload all of the freight from Mars Supply Two, which we frequently refer to as MS2. They were then given a phone book containing over six hundred names followed by six digit numbers. Carla noticed that all of the numbers started with 000. "What are these phone books for?" asked one of the newcomers. "That is the Mars phone book my friend, it contains the phone number of everyone living on the planet. On the front page you will notice a special listing of important service numbers, we even have 911 service for emergencies." "That's all well and good one newcomer responded but we don't have phones." "You will have as soon as your ship is unloaded which could take, as I said before, anywhere from a day to a week and another couple days to get them activated and programmed."

Walter interrupted, "Now I have some other very interesting things to show you." He lead them to the other side of town where he pointed out a building bearing a sign that read MARS-TV. Yes we have our own live TV news twice a day, there is occasionally other live programing, the rest of the time they show recorded video . They operate five channels during prime time but at least one channel 24 hours a day. All of that is complements of the five major Networks. In addition to the Government and Mars Colony, Inc. the networks have a dozen employees here in the colony.

At the moment you are standing in Colony City, the capital city of the Mars colony. And we are standing at the corner of Front Street and Colonial Parkway. The other three streets are Main Street, Broadway and Industrial. I am now leading you down to the equipment storage and supply lot at the end of Industrial."

"Here you will find all of the tools and equipment that you will be using. On the other side of the lot is where we store all of our material's. A lot of our

equipment is old and due for replacement. Thanks to Jake, our motor pool genius, most things are usually in working order. There is supposed to be a lot of new equipment arriving on the Mars Supply Two that you arrived on. Even more is expected when Mars Supply One comes in about four months from now.”

“You folks just make yourselves at home and look around at anything that interests you. The only restricted area is the observatory, to go there you must be accompanied by an authorized employee. If you would like to visit the observatory just flag down someone wearing a blue and white ID card pinned to their jumpsuits. You are welcome to explore anywhere else in the city but it would still be impolite to enter someone’s home unless you were invited in.”

As promised lunch was mostly cold cuts and a bowl of soup. There was a large bowl of pickled mushrooms on the chow line as well. “Where do the mushrooms come from” Archie ask one of the cooks. “Mushrooms are the only food that we currently produce here on Mars. We have a walled off room at the back of this cavern that receives little light. We had some steer manure and straw brought up from Earth a while back and the mushrooms thrive in it. You will eat a lot of mushrooms while you are here.

Some of the scientists are raising a test vegetable garden under grow lights but so far without much success, It takes so much electricity to power the grow lights that it is cheaper to bring canned vegetables in from Earth. It would help more than you could imagine if we had plenty of electricity.

The kitchen staff could recognize the members of our kitchen staff by their white work clothes. Our kitchen workers were collared immediately and put to work. There were about eight of ours already on the planet the rest were still on the ship, or en route to the planet in one of the Shuttles.

There are three Shuttles but Shuttle three is already moving cargo from the ship to the elevator pad which crossed through a double air lock to ground level where men with electric fork lifts were removing pallets and placing them in a preprepared area of the supply yard. As the fork lift drivers placed the pallets in the holding area they spaced them out so workers could see and get at the contents of each pallet. Tim found the foreman and was put to work unpacking crates. “Lumber here is a precious commodity so we are very careful in dismantling the wooden packing crates and the pallets. Everyone wants wood to construct furniture and construction crews have an insatiable appetite for wood for all sorts of things. We even straighten the nails and save the screws and binding strips for future projects, so take your time and stack the material that they contain so that people seeking that particular item can easily locate it. Sort the lumber and nails and screws and put them into inventory in those racks and bins over there.”

Tim had only unpacked a few things when he noticed it was almost dinner time. He went to the mess hall where they once again had soup and sandwiches. While he was eating, an ordinary house fly lit on the half sandwich

lying on his plate. Casually and without giving it a thought he shooed the fly away, then it occurred to him, This is Mars, what are flies doing on Mars. He asked Carla Later and she said "Oh, yeah, we see them all the time in the kitchen, kinda reminds you of home doesn't it?"

After dinner he unpacked a few more crates while Carla was still working in the kitchen. Then on his way to the kitchen, as he was rounding the building what should he behold but an ant hill and hundreds of the little critters working away, carrying bits of food from the kitchen. Carla said later, "They must have been transported up from Earth with food stuffs and had just made the best of it."

The group that Included Tim and Carla had returned to the supply building and drawn out a mattress, a blanket a porta-potty, two rolls of toilet paper, some shaving depilatory, some after shave and several other items. The bags with their belongings in them were also now available at supply. When they had their items selected from the shelves they took them to the desk at the rear of the room where the clerk scanned them and bagged them. "How do we pay for these things?" Carla asked "Oh, there is no charge they are all free to employees, even though you don't have your permanent ID cards I can see by the cards that you are wearing that you just arrived today.

I have some good news for you. We have your cell phones in, they apparently came off the ship in the first load. What are your phone numbers, I will get them for you? Carla quickly consulted the phone book she had been issued and gave the clerk the numbers. He disappeared into a back storage room momentarily then returned with two cell phones. "Are you familiar with these," he asked. "No, you better show us." "You just strap them to your wrist," he showed them his. "To make a call you push the big blue button beneath the dial then speak the word 'CALL' followed by the name or number of the person you want. "He pushed the button on the face on his phone, then said "CALL' Carla Erkin." Carla's phone rang. The clerk then told Carla to depress the blue button and immediately release it. Carla did as he had instructed and she heard his voice coming from her phone. "Now Carla, to change volume depress the red button on the top of the watch. There are four volume presets, it starts at the lowest setting then keeps getting louder until it reaches maximum volume then starts over at the lowest setting. When you want to disconnect depress the blue button again and release it. Had I said "CALL" 000565 then Tim's phone would have rung. You can either use the persons name or number and it still works. There is a yellow button on the side of the watch, if it is blinking that means you have a missed call. Depress that yellow button for information about the call you missed. We already have a cell relay set up at each end of The Company cavern so you can use your phones anywhere even in the tunnel." Tim and Carla started picking up their items but the clerk interrupted again.

"Not so fast, I have one more little gadget for you, it is your personal radio receiver. Bob produced two small plastic gadgets obviously shaped to fit

inside the outer ear like a hearing aid. There were two tiny buttons on the outside. The clerk who's name was Bob removed his pen from his pocket and depressed the red button several times and they could hear pop music coming from the device. Bob then depressed the yellow button and the music changed from pop music to Country and Western. He depressed it again and soft and melodic music could be heard. One more time and they heard a voice talking. "I guess that was pretty obvious," he said. The red button turns the set on and sets the volume. You need to Increase the volume by punching the red button several more times in order to hear it while it is in your hand. Then you press the yellow button to change stations. After changing stations depress the red button again twice in rapid succession and it turns the device off then depress the red button again and it comes back on at the lowest volume level. Hold it up to your ear and if you can hear it all right put it in your ear. If you want it a little louder depress the red button once or twice more to Increase the volume to where you want it. Then insert it into your ear. There are five volume settings and there are four radio stations always broadcasting. One plays pop music, one plays C&W, one plays elevator music and the fourth is talk radio. Talk radio is the most popular. We have ten or so talk radio hosts, most of them invite listeners to call in and give their opinion about the subject being discussed. The three music stations are automated but the talk station is live, it comes on at 0500 every day and goes off at 2400. Up until now we only had three hundred people on Mars so we didn't get all that many people calling in but now with over six hundred people there will probably be a lot more call ins. When no one calling in then the host reads news or just blabbers on with his or her own opinions and views. If there is an emergency the host can over ride the music broadcasts and switch everyone's set to the talk station while they describe the emergency or make the announcement that management has given them that effects everyone. They even break in on the music to remind people that the dining room opens in five minutes or lights out is in ten minutes, stuff like that. You don't have to have your radio on at all times but it is a good idea to keep it on so you don't miss an important announcement." Tim and Carla adjusted their volume and of course selected talk radio and inserter the devices in their ear. "Most people just remove the device if they are having a live conversation with someone and don't want to be disturbed by their radio for a little while but many of us have gotten so used to them that we can hold a private conversation with the radio on. Whatever works for you. The battery is good for about a year but if it goes dead just drop by and I will put a new battery in for you."

"Any time you folks think of anything else you want between the hours of 0800 and 2000 just drop in and pick it up. I might suggest that you take one of those first aid kits over there because you are bound to get some cuts and scratches during your first few days. The atmosphere here in these caverns is richer in Oxygen than you are used to on Earth so be sure and take one of the Oxygen pills if you get light headed and the condition will clear up immediately. They took a first aid kit and the clerk, Bob scanned it and put it in their bag. They also noticed a plastic privacy shield that stood four feet high and was supported by four plastic posts, they could tell by the picture on the label that

they were intended for use with the porta-potty, so they took one of these also. They then selected a pair of clean work clothes each.

"When ever you folks want clean work clothes just bring back the dirty ones and deposit them in the big hamper out front, then come in here and draw clean ones," Bob told them. "We have some big washers and dryers set up in the building behind this one." "What happens to the waste water?" Tim asked. "There is just a sump hole in the public rest rooms and all the waste water and stuff goes down that hole, we never see it again and really don't know where it goes from here. Maybe it comes to a river down there somewhere and just flows off into uncharted territory. One thing for sure is that this planet can use all the bacteria it can get from us humans." Maybe so, thought Tim, now that we have finished polluting the Earth we can start polluting Mars. Of course, the handful of people that are here now are just surviving the best they can but someday soon someone is going to have to address waste disposal before it becomes a real problem.

After they left Tim told Carla, "On Earth now they have equipment in third world countries that can process human waste and kill all the harmful bacteria and germs but leave a useful top soil material that can be used safely to grow crops. There are plenty of nitrates in this Martian soil that we find below the surface of the planet. These Nitrates are one of the main components that enable plants to grow. The Nitrates feed the sugar bacteria produced by the process of photosynthesis. We have plenty of nitrates on Mars and after all that is the backbone of producing a fertile top soil that will support growing plants. It also produces the Nitrogen that makes up the bulk of our atmosphere. The action of the nitrates feeding the sugar bacteria is what enables the plant to give off Nitrogen. Lack of fertile top soil containing nitrates is one of the biggest problems in the third world. Top soil is an even bigger problem, there are parts of Africa that used to support farms that now lay barren because the top soil has all blown away. Even in the United States back in the 1920's they had what they called the dust bowl, where all the topsoil was either covered with fine dust or had blown away. Thousands were driven from their homes in Oklahoma and North Texas."

Tim wrote a report about what he knew on this subject and passed it off to one of the scientists that he saw walking through the compound. The scientist stopped long enough to read what Tim had handed him then told Tim that, "a machine like that is already en route to Mars and they should have it on the next ship. We have not had one in place sooner because it hasn't been our highest priority. With the addition of all you new guys we know that good top soil proper waste disposal will now be of greater importance. We have tried killing the bacteria in human waste on the surface but when we get it back down here in the cavern it is just as useless as all the other Mars soil. Those unfiltered UV rays on the surface kill all bacteria. Including the bacteria that our bodies are composed of."

Tim said when they left the supply building that he would like to spend

his first night near the public rest rooms because he did not relish using the porta-potty. Carla wanted to be close to the Mess Hall also so they located a spot between two permanent houses then asked the occupants if it would be OK if they camped there that evening. "Sure, If there is anything you need or if I can be of any help just let me know."

"I can't get over how friendly and accommodating everyone is here," Carla remarked. "Yeah it's sure a lot different from Earth, it's just like being on another planet, Ha Ha."

Little did any of the more than three hundred people who had arrived on the Mars Supply Two that day that only fourteen of them would ever return to Earth.

CHAPTER - The early days

Carla had to report to the kitchen at 0430 to fix breakfast but Tim had six days off to build his house and get things set up for temporary living. "Only one blanket and we don't know how cold it gets here at night Carla said, I wonder if we are going to get cold.?" "There is a question that I can answer, said Tim and the answer is no. These caverns are maintained at a constant 73 degrees, year round, you will never be cold and you will never need a coat. Carla took her bag of toiletries and headed for the public rest room. The place was busy but she had little trouble in finding an open shower stall. Surprise it worked just like the showers on the ship. After her shower she found an open wash basin with a large mirror where she finished her toiletries and returned to her camp. She returned about the same time as Tim. They donned their night clothes, inflated their mattress by pulling the well marked tabs and crawled in to bed to spend their first night on Mars. March 28, had been a very busy day, indeed. The lights in the Cavern went out promptly at 2200 everything quieted down and they both fell asleep almost immediately.

September 29, 2107: Carla's phone rang at 0400, Carla located her phone and fumbled with her watch before she located the button. She notice that the button was back lit and blinking so she pushed it. Hi Carla, this is Hilda, I am just calling the members of my crew that are assigned to prepare breakfast. I didn't know whether you had an alarm clock working yet or not. You need to report to the kitchen in 30, minutes to help prepare breakfast." "Oh, thanks Hilda, and you were right, I didn't have my alarm clock working yet. I'll see you then." She then pushed the button that had started blinking again when Hilda hung up. And crawled out of bed. Tim just groaned. After a visit to the public wash room Carla got dressed and went over to the kitchen.

Hilda was there there to set her to her tasks. By 0600 people began to pour in and breakfast came off smoothly. This morning the kitchen was serving oatmeal and toast with canned fruit. Tim received a call just as he was finishing

his breakfast at 0645, asking him to report to The Company cavern at 0700 or as soon thereafter as he could make it. Carla couldn't help but notice how many people had their ear pieces in and were moving to one kind of music or another. After a while you will even learn how to tell which station they are listening to by just watching them," one of the other kitchen workers said, "If they are really grooving then that means they are listening to pop. If they have a serene expression on their face they are listening to the elevator music, If they look sad it's C&W, and if they look as though they are listening to a conversation then they got the talk station on. I make a game of trying to guess. Most often they are listening to talk radio, that's the most popular."

Tim arrived at work at 0650 and struck up a conversation with Jack Overmeyer. "Did you notice that it is warmer in this cavern than in the Government cavern, Tim?" "Nope, I haven't been in here enough to pay it much attention." "I spent the night in here last night and had to throw my blanket off, when I got up to go to the bathroom I noticed that it felt chilly in the other cavern, so this morning I went around feeling all the walls and in the far back and off to your right there is a hot spot that you can't hold your hand of for long. I then checked the floor beneath the hot spot and found that to be even hotter."

Just then Carter Fredrick, facilities superintendent joined them and Jack related what he had observed to him."Show me that spot Jack." The three men skipped to the back of the cavern and Jack said, "OK, now put your hand right there." Sure enough Carter didn't leave it there for long. "Now check the floor right here below the hot spot," Carter put his hand on the floor for an instant then removed quickly and began to check it for damage. "All right after I get all the crews busy I will consult the scientists about drilling right here." The three of them skipped back to where the other construction workers were gathered. Carter had work assignments based on the crew lists from the ship. "I am assigning you people to the same crews that you had on the ship for now but feel free to change crews if you see another crew doing a job that you have some expertise in. The tools and supplies that you will need can be picked up in the supply area of the Government cavern. At that point he handed out a list of assignments for each group. "My name is Carter, I have been heading up the one crew that has been working here for over two years. I have assigned one of my people to each crew because they know how to find stuff, they are not the crew foremen but each of them has a lot of good information that he can share. Since each of the crews have been together for the last couple months I imagine that you have a pretty good idea of who you would like to see as your crew chief, so I would like for each crew to informally pick one of your own and give me the name so I can make a note of who to call on if I need to contact your crew. We will figure out a better system later on."

In addition to working on your crew we have a work order board in the Government cavern, it is posted in front of the supply room. You should check the board every morning or evening when you are off duty. If there is a work request posted that you believe that you have the necessary skills for you

should remove the thumb tack and remove the request. Notify your crew chief before starting work for the day that you have the work request then handle that first before catching up with your crew. In that way all requests for repairs or improvements needed by the members of the community will be handled promptly. If there are still any requests on the board when I come over to hold muster I will bring them in with me and assign the job to a volunteer.

With that the crews all had a little meeting to pick their crew chief. Crew six actually held an election and elected the guy who had been on Mars before they arrived yesterday. Each of the crew chiefs came up to Carter and gave him the name of the person selected. Then they all went right to work, assembling the tools and supplies they would need.

The people on Crew eleven assembled and all eyes turned to Tim. One of the men said "You are the one with the engineering degree Tim, I can say that you helped me a lot during training, explaining the technical stuff behind what the instructor had told us. I nominate Tim Erkin to be our foreman, any seconds," everybody seconded the motion so they didn't need an election, Tim was elected. Tim went over to where Carter was standing and told him "Crew eleven selected Tim Erkin." Carter just circled the name on the list and said "Thanks."

Some crews were working topside making cement blocks, some were picking up blocks that were already cured and started building public rooms like the dining room, kitchen and public bath rooms. Some went to work laying in a water line, to the kitchen, while another crew installed the reverse osmosis system, where the water from the river entered the cavern above the falls. Some were running temporary wiring in from the diesel generator that was situated in the Government cavern. The remaining crews had equally important tasks. As the morning progressed some of the workers traded places with workers on the other crews based on previous experience, knowledge, skills and abilities. I have a lot of experience in installing electrical wiring and would be of more benefit to the job if one of you guys has plumbing experience and wants to change jobs. Sure enough some person would say yeah I have some plumbing experience but I don't know squat about electricity, so they would switch jobs. Some of the crews had surplus men because the job was being done by just three or four people that seemed to know what they were doing so the surplus workers would find a crew that needed more help and go to work there.

Carter watched the progress in awe. The field kitchen was planned to be adjacent to the Government kitchen but the men themselves had elected to set it up in The Company cavern and had it all set up in a couple hours. One of the crews had located the new walk in refrigerator which was packaged on five separate pallets, got hold of a forklift and started assembling it with the door opening into the kitchen. After the lunch break they quickly had it all assembled, wired in and running. Thelma entered and watched along with Carter as the crews transformed the Company cavern before their eyes.

Tim saw Carter take Thelma back and show her the hot spot. It was located at the back wall, near the right side of the Company cavern as you entered from the Government cavern. The Company cavern was 1.2 miles from front to back, it was a little over half a mile wide at its widest point but tapered to only about a quarter mile wide where the tunnel entered. It was about three eighths of a mile wide at the back wall. Of course none of the walls ran in a straight line. The hot spot was just over a mile from the tunnel entrance. The floor space in The Company cavern was equal to about 930 football fields at floor level.

Thelma and Carter examined the hot spot then left the cavern, returning a few minutes with a couple of the Government scientific types. They pounded, prodded, drilled out a few core samples from the wall and the floor. They left the cavern, only to return a short while later with some other scientists. They talked some more, made some notes. A short time later woman with a camera came in and took several pictures of the blank wall and the floor. Then they all left. About 1130 Carter returned and told Jack that he had done every one a big favor. It is fewer than one hundred feet down at that spot on the floor to where it is over one thousand degrees Fahrenheit. It would be the ideal spot to mount the geothermal generator. That spot could even be blocked off from the rest of the cavern. There is a good water supply in the creek here so it looks like we have found the spot for our generator, one of them anyhow.

The workers broke for lunch 1200 but most of them were back working even before 1300. "I have never seen people this industrious but I guess this is what you get when you only take the cream of the crop." Carter remarked to Thelma. "I'll have to admit that I had my doubts yesterday when I discovered that about half the construction workers were women but I am proud to say that they seem to be doing just fine." The crews knocked off for the day at 16:30 to get cleaned up for dinner. A few of them still stuck around to finish what they were working on.

That evening The Company cavern was a lot better lit and four hundred new houses had one level of blocks laid. The crews had not made the walls higher because they had run out of blocks. The block makers had more than one thousand new blocks curing on the surface, near the elevator. A few of the workers had already had a chance to try out their Mars suits on the surface. Tim walked by the supply area and was amazed to see the amount of material that had already been unloaded from Mars Supply Two. There was an acre or more of Supplies now available. Eventually the supplies brought in by the ship would cover more than five acres. All of the pallets and crates had been carefully dismantled and the lumber stacked just like any other supplies. Once all the wood had been stacked the new people would each receive their fair share for their personal use.

Tim went to the public bathroom and cleaned up. His crew had been laying cement blocks and required little advise or supervision from him. He had spent the day working as a gopher for the other crews because he knew better

than most, how to find things at supply. By the end of the day he had a pretty good idea where to locate tools and materials that the various installers needed. Carter spotted Tim in the chow line, and came up to him. "Tim I see that you have had some well drilling experience. How would you like to be on our drilling team starting tomorrow morning?" Walter and Thelma Potts were right behind Tim in line and they invited Carter to step in front. Nobody minded much when a friend joined someone in line because the line moved pretty fast anyway. "I would love to do some drilling Carter, I have spent a lot more time drilling than in construction and that is what my degree is in." "Good then tomorrow morning you can pick your team, but you have to take Freddy as your first choice because he has had a little experience drilling on Mars. Freddy is not a leader, he's a follower but a good worker and he knows a lot about Mars." "How many men would you think that I need?" "I don't know I haven't had any well drilling experience, in fact you seem to be the only construction guy that I could find with any." "Let's start with about eight then. Ordinarily I would say that we need timbers but since wood is scarce we can settle for a ladder and a superstructure built from pipe, and a platform at the top made of lumber to hang the drill from. By the way, do we have well drilling equipment?" "I don't know you might have to improvise something." Tim had stumbled across some equipment earlier that day when he was looking for something else. That evening, after dinner he enlisted Archy and a couple people that he knew and they constructed a ladder the superstructure for the rig and a platform.

CHAPTER - Tim drills a well

September 30, 2107: That morning, Tim selected his crew and they went to work. They scavenged part of what they needed and jury rigged the rest. They did have some shaft and a drill head, they converted the u-joint and motor from an old fork lift to be mounted on the platform and turn the shaft. By the end of the day they had tested all the equipment and had drilled a hole twelve inches in diameter and about three feet deep.

October 1, 2107: (from Tim's notes)"This morning we started drilling in earnest but it is not going very well, the drill head keeps binding up and something we are trying to drill through keeps dulling our drill head so that it has to be resharpened every few feet. We have obtained a high pressure pump and a fire hose. We keep washing the clay from the drill bit with the nozzle of the hose before it can be resharpened. I had an idea, we removed the drill bit and ran the fire hose through the shaft and gave it full power. The soft clay began to liquefy and bubble to the top. I noticed small rocks ranging in size from the size of walnuts to the size of apples being forced up to the surface. I figured we must be drilling through an ancient lava flow. I picked up the rocks that were being forced to the surface and threw them into a wheelbarrow. We were down almost 50 feet and the thermometer indicated that the temperature was up to two hundred fifty degrees. We needed around one thousand degrees

to obtain sufficient conversion steam to turn a generator the size of the one we intended to mount and make electricity. That afternoon when the crew went off duty my curiosity was getting the best of me so I went over to the lake and rinsed off the rocks I had collected. They looked kind of pretty so I put them in a canvas bag and took them to my quarters. I didn't know at the time what I would eventually use them for but on Mars you can find a use for everything. Maybe I could mount them in concrete and use them to decorate around our front door someday."

The talk radio announcer who called himself Harry Martian broke in to the music stations to announce that drilling had started for the hole that would enable the new geothermal generator. Tim had his ear piece radio on the talk station and was amused at the different spins that the listeners put on the project. A couple callers feared that what they were doing could cause a volcano to erupt in The Company cavern. Actually, thought Tim, that would be a possibility. Tim found himself thinking about that possibility the rest of the day. After work Tim looked up the scientist he had met named George Schultz, and asked him what he thought. George said, "you don't need to worry at all about your drilling effort causing a volcano," "How can you be so sure?" "I am not at all sure that it won't, Tim but if it does you won't have long to worry about it." Somehow Tim did not feel at all reassured.

October 2, 2107: (from Tims notes) We reached a depth of 60 feet and were getting a temperature of over six hundred degrees. We continued on slowly until at just under one hundred feet we were getting the one thousand degrees that we needed. We withdrew the hose and sank a blade that I had found in the supply yard that enlarged the hole to a three foot circumference. We then started inserting a double 6" pipe joined at the bottom by a U shaped fitting.

When the U at the bottom connecting our two pipes reached five hundred degrees we began to pump the cold water from the lake into one of the pipes. Hot water began to spew from the other so we connected a hose to the end where the hot water was bubbling out and fed that into the lake. We were taking our cold water from the headwater of the stream just below the falls. By this time another crew had mounted the generator on cement blocks so we connected the out hose to the generator and ran the exhaust water hose from the generator into the lake. We then powered up the generator and it began to pump water into the lake. We then eased the dual pipes deeper into the hole. Shortly we had raw steam flowing into the generator and the fan began to turn. While we were busy with these tasks the electrical crew had wired the generator into the electrical system and the power began to flow. Once the pipes were at the bottom of the hole we aliened the pipe from the generator to line up with the output pipe and cut the motor forcing the cold water into the pipe. We didn't have long to make the connection before the U at the bottom of the pipe would melt. When the live steam diminished enough that we could handle it in a Mars suit one of the men connected the live steam pipe directly to the generator and we restarted the pump sending the cold river water into the

ground. On most steam generation systems the water is cooled and recycled but in this case we needed to heat the water in the stream and the lake so we are constantly drawing cold water from the headwater just below the falls and depositing it back into the stream about thirty feet down river. This should be adequate to heat the stream and lake to a temperature that can accommodate trout and even catfish. We were generating close to thirty megawatts of power and it was up to the electricians to route it throughout the facility and put it to use. I don't know how much thirty megawatts is but they tell me it will be all the electricity we will need until for some time to come.

That evening everything in the caverns seemed to burn a little brighter. We left the old diesel generator hooked up as a backup system but we had quit running it.

CHAPTER – The Food on Mars

October 5, 2107: Besides the ever present mushrooms the colony also raised chickens, rabbits, turkeys, ducks and geese. There was a small herd of goats but there wasn't enough for them to graze on. They produced a little milk but Tim never knew what happened to that. There certainly wouldn't have been enough to go around. Once in a while they would butcher a kid but Tim never found out who got the meat, he suspected the kitchen staff as there would not be enough fresh meat to go around either. They were getting enough frozen meat from Earth to flavor their food but they seldom if ever had steak or roast beef or any plain meat dish even hamburger. There always seemed to be bacon sausage and once in a while, ham.

Tim looked up the two guys from the Scientific crew that were working with the small experimental garden and ask them what all it would take to grow enough vegetables to meet the needs of the community of now over six hundred people. After some discussion they finally decided that they would need about 160 acres of fertile irrigated land with adequate grow lights to raise everything they needed.

In the early part of the twenty first century in the United States the rule of thumb had been that it took one acre per person to provide food to the country. Around 2025 The United States changed from a net food exporting country to a net food importing country. In response to this development farmers became a lot more efficient at food production. By 2107 the ratio had been reduced to half an acre per person. Thanks largely to the more extensive use of hot houses for growing vegetables. On Earth the growing season for most foods was still seasonal. On Mars there were no seasons and all food could be grown year around and around the clock. That meant that on Mars the ratio would be about one quarter acre per person. That included the room that the animals required. Tim had in mind that the entire area on the Company cavern behind the lake and stream, which was approximately 320 acres would be the ideal place for

the farm. That would provide all the land that they would need to easily feed a population of one thousand people. By the time that the population exceeded one thousand they would have more land because more caverns would be opened. Tim got a list of the fertilizers that would be needed to bring the Martian soil to life and keep it producing for one year. They then worked out just how many grow lights they would need to run a hothouse of that size. The results were staggering but undaunted Tim spent his next day off working out a requisition for the needed material and an estimate of how much was spent by The Company and the Government to provide the community with canned produce that nobody enjoyed eating. In his equation he allowed for six full time gardeners. The conclusion reached is that it would be cheaper to raise their own vegetables on Mars, a lot cheaper.

The next morning before work he gave a copy of his findings to Carter and another copy to Thelma. The report was well received on Mars. Walter and Thelma submitted an edited copy of Tim's report to The Company and the government. Everyone agreed that was what should be done but they knew the schedule and knew it would be about seven months before the requisitioned items would arrive. They would just have to continue eating canned vegetables until then.

October 5, 2107: Message received from Company on Earth. We have planned a farm on Mars all along. Knowing you would have adequate electricity soon we have already shipped your farm supplies, grow lights, equipment and four farmers. They are now en route on Mars Supply Two and should arrive around January 15, 2108.

October 10, 2107: Not completely satisfied with that Tim and Carter gathered up all the grow lights they had and all the other lights that could be converted to grow lights. They then cleaned out the goat pen, the rabbit pens and the chicken pens and were able to set up a two acre test farm in The Company cavern. Some of the people with gardening experience volunteered and two of them were assigned as full time farmers.

CHAPTER – Their first Christmas on Mars

Their first Christmas on Mars was something to behold. Of course they

had no trees, even artificial trees other than one artificial tree that had been sent up by the Government two or three years back and was looking kind of dog eared. They didn't have any factory made decorations except for those sent by the Government to decorate that one lonely tree. Everyone fashioned every day items and made their own decorations. One couple who's hobby was wood carving drew out enough wood from supply to carve a nativity scene. Archy organized a choir of carolers. For the week leading up to Christmas they roamed the facility for about an hour every evening singing carols

Gift giving was the hardest part but everyone came up with some sort of original idea as to what to give and to who and how to wrap it. A lot of unique ideas went into that part of the holiday. Carla baked Tim a batch of chocolate chip cookies in the kitchen and wrapped them in foil. Tim was stuck, he couldn't think of a thing to give Carla, then he remembered the rocks he had picked out of the mud when he was drilling the well. He picked out a middle sized rock that he thought was the prettiest, it was about the size of a Roma tomato. He wrapped it in a blue paper towel and tied a red string around the top.

They went to a special Christmas dinner on the evening of the 24th. Carla had arranged to have the evening off. After dinner they returned to their little house and exchanged gifts. Tim was especially pleased with the cookies and felt a little bad that he hadn't gotten something better for Carla than that ugly rock.

When Carla opened her gift her eye's opened wide and her mouth dropped open and she gasp two or three times to get her breath. "Tim, where on Earth did you find this? I didn't find it on Earth Carla I found it on Mars." "Well unless I am terribly mistaken this is about a three ounce uncut diamond. It could be worth almost a million dollars on Earth. Then Tim's mouth dropped open and they just sat there for a minute looking into each other's mouths. "Were there any more of these where you found this one," Carla stammered. "Yeah, I have a whole bag of them, altogether maybe five or six pounds. He retrieved the bag from amongst his belongings and emptied the contents onto the table. Carla just sat there and kept saying "Oh, my God." "Oh, my God." over and over. If these are diamonds and I am almost sure that they are do you have any idea of their value? Maybe millions and possibly even over a billion dollars, once they are cut and polished, that's billion with a B."

If that is the case Carla they won't be worth anything if their existence becomes common knowledge. Carla said, "wait a minute, I met a man here on Mars, one of the scientists who's father is a jeweler and diamond cutter. My acquaintance, Paul Silverman, said that his father was teaching him the trade but Paul said he wasn't interested and went to MIT where got a PHD in Math instead. Paul, or rather Dr. Silverman is a Government employee. I think we better get him on this anyway and see what he has to say. Tim chuckled and said " if Silverman means what I think it means he won't have anything to do on Christmas Eve anyway and it is still early, so I can't resist I am going to give him a call."

"Hello, this is Paul." "You don't know me Dr. but you may know my wife Carla, Erkin that works in the kitchen, my name is Tim Erkin I am her husband and I work in construction. The reason that I am calling is that I found some unusual rocks the other day and Carla thinks you ought to see them and maybe identify them for us." "Yes Tim I know who your wife is, lovely girl, you are a very lucky man. Certainly I will be happy to look at your find and identify the stones for you, please bring them by anytime." "How about now Dr. are you busy." "Well I am watching a movie on TV but I guess I could put that on record when you get here. I live at 850 Broadway and I'll be expecting you and your lovely wife. Tim put the stones back in the bag and they were outside Dr. Silverman's entrance within five minutes. Come on in, folks and show me what you have found that you are so curious about. After shaking hands, Tim reached into his bag and pulled out a small stone at random and handed it to Dr. Silverman." The good doctor's mouth dropped open and all he could say was "Oh, my God." "Oh, my God." over and over. "I had the same reaction Paul but I wasn't sure, you have just confirmed it." "Could I see the other stones please Tim?" At which point Tim emptied the contents of the bag on Paul's table. Paul took his eyepiece from a desk drawer, sat down and began to examine Tim's find piece by piece.

He selected one with a sharp edge then picked a cut gem that he had been working with. Paul explained that making jewelry was his hobby. "I make up items here and then send them back on the next ship to my family who sell them for me and deposit the money in my account. I don't know whether you knew it or not but it is free to send things back to Earth as the ships are all returning empty anyway." Paul then took the stone and made a sharp cut into the faceted stone that he had picked up off his workbench. It is seven in hardness he said. He then held the stone up to the light and studied it as far as I can tell this is a perfect stone., he announced. Paul then put it on a scales, this particular stone weighs in at 4.2 oz or roughly 441 carats. Paul then put the whole collection on his scales, the combined weight was 12.5 pounds, or about 21,000 carats. You would lose about half in cutting. If you just cut them into one carat stones you would realize about 10,500 one carat perfect diamonds currently selling at \$2,700.00. These would retail at about 28.5 million dollars. If I cut and polish and market them for you my family and I would take 75% of the retail value. Understand that my family does not deal in retail. We are wholesalers only. But doing it that way you would still have over 7.5 million for your share. We are going to do better than that though I am going to sell some of these as two carat stones, some as three carat some even as larger stones. My family frequently deals in very large stones which are worth far more per carat. Your share could easily come out to between 15 and 20 million dollars.

"Come, you two sit over here and let's talk. Would you care for a brandy?, I have it sent up from Earth and I have never offered anyone else a drink of it before because it is too expensive, but this, this is an occasion that deserves a whole bottle of brandy. "Sure Paul, I haven't had a drink in a long time and I think you might be right, this is worth it."

Once they had their drinks Paul started. "Here is our problem, the way I see it. If we are not very careful we could ruin the diamond market on Earth if word of these stones got out. Diamonds themselves have only their industrial value which would make these stones here worth only a few thousand dollars. What diamonds do have above and beyond their intrinsic value is their perceived value. If the market collectively perceives that are worth fifty million dollars then we can sell them for twenty five million. If the market were to perceive that they were worthless as jewels then they would have only their industrial value.

I have the equipment here on Mars to cleave them cut them and mount them. I have been on Mars for only two years now and I have eight years left on my contract before I can return to Earth. We must never let anyone know that these stones are from Mars or like I said the Diamond market on Earth could collapse. It is only the law of supply and demand that supports the market. Even the big diamond mines in Africa and elsewhere withhold stones from the market in order to maximize their price. I could cut a one hundred million dollar diamond out of that grapefruit you have there but what would I do with it. No such diamond presently exists and someone would catch on once my Martian background came to light. Here is what I propose. I should cut most of these stones right here into large but imperfect facets. Then mount them in unattractive silver jewelry and send them to my family on Earth. I will instruct them to open new Swiss bank accounts one for you and Carla and one for me. They will then rework the stones and melt down the settings which they will send back to me as bulk silver. They are dealers so they will have little difficulty in marketing the stones, they will keep half the proceeds from the sale of the stones and deposit one half of the other half of the money into each of our accounts. You can trust them they are my family and my family has been making their living in this trade for over two hundred years, they and I are ascetic Jews . Because of the sensitive nature of our family business no one of us have ever cheated another of us not even once in that whole two hundred years. We have had to set our moral values that high because we have had to prosper under hostile governments in order to survive. If there was ever a business where a man's word was his bond, it is this business. Even though I am a PHD in math which has irked my family to no end I still can't get this stupid business out of my life, I was born and raised in it and even came to Mars to get away from the stigma that goes along with this business and my religious lifestyle but here I sit in my spare time working with these damned stones."

Tim took Carla by the hand and pulled her toward the door. "Excuse us a minute Paul we have to talk." Outside, Tim told Carla, I know about these people, they are very clannish, and what he says about trust is absolutely correct, hell these people even survived and did business during the Holocaust, in Nazi Germany when all the other Jews were sent off to the concentration camps. I say we go for it. I can always get more stones from where I got these so we have almost nothing invested." "Sure Tim it sounds like a win, win situation, let's go for it."

In the days that passed they maintained only a nodding relationship with Paul. On one occasion several weeks later he told Carla "Come by the house this evening there is something I want to show you. That evening Tim and Carla went over to see Paul after dark. Once inside Paul poured out the contents of a velvet pouch onto a velvet pad. There were almost 20 cut diamonds. They looked large but irregular. "Look, these are all the product of one of your smaller stones. Since I am being particular when I cleave them but intentionally clumsy when I cut and polish them I am able to turn one of these out at approximately one per day. These are all six to eight carat perfect diamonds. By the time my relatives on Earth finish with them we should each receive approximately five hundred thousand dollars. I just have time before the next ship to Earth leaves to make some ugly cheap jewelry to mount them in to make them look like dime store stuff to the untrained eye. I will be sending a shipment like this out on every ship for the next several years. I will give you your numbered account information as soon as I have it. Aside from that you are just going to have to trust me and my family until you return to Earth.

The next evening Tim and Carla were discussing their situation. "According to what Paul has told us we are going to have more money in Switzerland when we get back than we have in the United States, Carla." "I am still a little uneasy about that Tim, that's an awful lot of money and those relatives of Paul's will have our account number." Not this next ship but within the year I want to post a letter to our Trustee and have him make periodic withdrawals from our Swiss account and deposit the money in our trust account at the bank. Then I want to order him to begin a regular stock purchase program of acquiring shares in Mars Colony, Inc." "I can see having him deposit the money in our trust account but why would you want shares in Mars Colony, Inc. They have never turned a profit and they never will." I made some inquiries about The Company before we left. It seems that 20 of the 25 richest individuals and corporations on Earth are behind it. They each put up one Billion in seed money to get The Company going. So far they have gone through that 20 billion and the investors have already kicked in another billion each and you are right The Company has yet to make a dime. Here is what I think, The Company has arranged to take title to Most of Mars. I suspect, they already have title to everything that is here except the Government cavern, and they are just using the taxpayers and the Government to help them with development expenses. Carla within a year we are going to be taming a cavern as large as a U.S. State and The Company will own it all. I have also considered the possibility that The Company already knows about the diamonds but they don't want to destroy the diamond market either. It's a fluke for me to have stumbled on to the ones I found, we were drilling with Water pressure because our drill bit wasn't working and the diamonds that I picked up were forced up with the mud. I didn't even know what they were but they fascinated me and I figured they were worth picking up. We used that slag to finish up around the hole and to mount the generator on, I would imagine there is as many diamonds that I did not pick up as there were those that I did pick up. Eventually we will be closing that generator down and then I will have a chance

to go through the rest of that mud. In the meantime those diamonds are safe and secure and I wouldn't want to do anything that looked suspicious, we can afford to let them lay there for two or three years. I will go over and poke around near the surface in a couple months like I am checking up on how our installation is holding up. If any are near the surface I of course will pick them up.

CHAPTER – New Years 2108

The workers in the colony had planned a gala celebration for new years eve. It was new years on Earth but who knows what it is on Mars. That didn't matter these folks had always celebrated new years and this would be no exception. When Tim arrived at the colony there was a group of Government employees that had organized a little Country and Western band and were entertaining from time to time when people gathered. They even played on Saturday evenings at the mess hall dining room and many couples and singles went over there to dance.

Some of the Government employees, like Paul had done had figured out ways to get some booze shipped in. It was against company and Government policy which tended to make it very expensive, but the ones who had been there for a while had their ways. A few folks always had a few drinks on Saturday evening at the mess hall.

Not to be out done several of the people who had arrived with Tim had also formed musical groups. There was one that played pop music and another what was also country and western. Each of these groups had made at least one appearance at the Saturday night dance and all three bands had their own shows on a different night of the week on MARS-TV.

All three bands played in the two mess hall dining rooms, rotating from one to the other. Almost everyone celebrated at one place or the other. They enjoyed the music, danced and generally had a good time they even counted down the last ten seconds of 2107 and everyone was kissing everyone else and someone shouted "This is January 1, 2108."

_____ JANUARY 2108 _____

Still there was something missing, alcohol. Oh for sure there were a few that did not drink, and would not drink but very few. The Company had not hired anybody that was a recovering alcoholic or had ever had a drunk driving arrest. So many times on Mars the demography of the population raised it's ugly head. The strangest thing about living on this planet was the fact that there was no old people and no children and no babies and no one who did not speak good English. That had never been driven home more than at the new years celebration. Even though there were no alcoholics among the population more than ninety percent of them missed not having a drink on New Years eve. They

had their ten second count down to usher in the new year, but some how it didn't seem the same.

CHAPTER – Cupid at work JANUARY 2108

So many people that had come to Mars as singles were now couples. Archy had started performing weddings although there was no place on Mars to obtain a marriage license and Archy was not an ordained clergyman. What the hell that is the closest they could get, so after the ceremony they just started living in sin, so what.

Walter and Thelma took all this into consideration and decided to set up a court house to start issuing marriage licenses. Little did they realize at the time that within the year they would be issuing birth certificate's also. A walled enclosure was erected and a sign hung over the entrance that read Court House. One of the women on Walter's staff that did computer input was assigned to move her desk over to the court house and use the computer to print marriage licenses which Walter signed. As it turned out about half of those that Archy had married didn't even want a marriage license. This was the hot topic on talk radio for over a week.

That evening Carla said to Tim, "I have been listening to talk radio, quite a lot, lately," then she remarked to Tim, "How can folks get so excited over the most inane things on that talk radio station?" Tim thought for a moment then responded, "I think that all of us have just so much attention span to use up every day, here in these caverns there is really very little of any importance to spend our attention on. It is not possible for talk radio to not talk about anything, so they just pick the most interesting of all the uninteresting things they have to choose from and discuss that. It's like that movie we saw the other night where the guy was in solitary confinement and had nothing to spend his attention allotment on, then he spotted a roach in the corner of his cell and spent all his time watching the antics of that stupid roach, he would watch it for hours on end, remember". "Well, no matter, I will probably keep listening to talk radio, and even calling in on occasion."

Back to the matter of alcohol. Since The Company furnished them canned vegetables and since The Company didn't furnish liquor it only made sense to use what growing capacity that they had to produce their own alcohol. Rusty at MARS-TV held a discussion on the news and invited listeners to call in whether they wanted to sacrifice their fresh veggies for booze or not. The call ins were about fifteen to one in favor of booze. So as each veggie crop was harvested the crop was replaced with corn. A couple guys who worked construction were from a part of the country where it was still common to set up a still and produce their own liquor. You could even get a permit to do that if it was for your own consumption. Both of these gentlemen claimed to be experts so they were unofficially appointed to head up that project. They scoured the

facility in search of copper tubing and the other materials they would need. They came up with everything they needed and constructed the first still on Mars. There would still be a lack of casks for aging but that would not be much of a problem. Nobody would want to wait for it to age anyway. The early batches would lack that nice brown color that one associates with good whiskey but it would serve to make Saturday nights a lot more fun.

One Sunday morning early in 2108 Tim and Carla were out for a walk when they came across Archy holding services for a dozen or so faithful. The service was about over so Tim and Carla listened to the conclusion of Archie's sermon. They didn't know much about religion but Archy sure seemed to know what he was talking about. He sounded very professional. When the service ended Archie approached them and asked Tim if he would help build a community church. "Sure Archy but we would have to clear it with Walter and Thelma. The next time he spoke with Thelma he brought the subject of a church up for discussion. "Oh, you know how the Government and The Company are about spending any money for the benefit of any particular religious group so we would have to call it a community chapel and claim that we needed it for weddings and funerals. I am not aware of any funerals coming up but I know of more than a dozen weddings that are being planned." Tim said, I could request Rusty to ask for volunteers on the nightly news to have those interested volunteer their time next Sunday to help build the Church, or a I mean Community Chapel." "Not necessary said Thelma, if The Company and the Government approve the Chapel we can build it on company time with company materials and even order a few items like pews sent up from Earth. By the way, Tim do we have a pastor?" "Well sort of, one of our construction workers is a lay minister. I have heard one of his sermons and he sounds very professional. I don't know what religion he represents but maybe he could be persuaded to conduct his services interdenominational."

Thelma got her permission for the chapel all right but the Government representative that she talked to in Washington said Oh, my god, we forgot all about that. With the population that you have now you would be entitled to three chapels and three chaplains. Watch the next ship Thelma you may be getting a priest a minister and a rabbi." Archy was not too pleased when he heard all this but just shrugged and said maybe the protestant minister will let me preach one day a week, that would be fine with me."

The company had been speaking with Carter and Walter and Thelma and were assured that the colony was prepared to receive a new batch of workers. "We are a lot better prepared now to receive three hundred new workers than we were when you sent the last batch she said. Besides the assigned work is pretty well caught up with now and Carter wants to start sealing the big cavern as soon as possible after breakthrough. Maybe you could send three hundred new workers on each ship until further notice. When we start on the big cavern we will need all the help we can get, it is going to be a big job to seal and pressurize that baby." A few minutes later another message was received from the Company "It's a good thing that you said that

Thelma because on the ship that is due to arrive in January there are three hundred more employees. Most of them will be construction workers but there will also be some surprises for you.

CHAPTER - Mars Supply One Docks

January 15, 2108: The first ship to arrive on Mars since the one that Tim had arrived docked at Mars orbiter. Tim kind of smiled when he saw 35 new faces step off the elevator and start looking at their new home. Of course Walter and Thelma were there to greet them. It wasn't the same as when Tim and Carla's group had arrived. This time the colony was ready for them. Tim and Carter and several other community leaders were conducting the tours.

Each couple and single were assigned to a new house that had been constructed for them. The houses had already been furnished with everything they would need from supply except for their phones, and their TV sets, those were still being unloaded. The hours for serving meals had been doubled and a hot meal would be served to everyone, including the new arrivals. The kitchen staff was a little short handed and there was a need for the new equipment that was arriving on The Mars Supply One but everything still went smoothly. Half of the new people were fed lunch at the Government kitchen and half at The Company kitchen. All of the meals would be handled in this manner until the new equipment had been installed in the Company kitchen. When the new arrivals were shown the house that they had been assigned they were told that they could trade with each other if two of them agreed. The work crews did not have to make three hundred new houses to accommodate the three hundred new people because so many of those who were already there had moved in with each other, there were quite a few vacancies.

Fourteen of the Government people that had been on Mars for the term of their contract were returning to Earth but eight who were eligible to return had opted to stay on without a job and become self employed. There had been negotiations, people involved, the Company and the Government. The people who wanted to stay prevailed. The Company and the Government agreed that they could remain as citizens of Mars. They had to reimburse the colony \$5,000.00 per month for their board, room and medical care but they were free unemployed citizens of Mars. If these people wanted they could receive a credit of one hundred thousand dollars for not returning to Earth. If they ever decided to return they would be required to pay the prevailing rate for passage. Several others who were eligible to return had extended their contracts for a few more years and remained in their jobs.

This time around the new arrivals were given up to a week to become acclimated to their new surroundings before starting to work. Oh my, how things had changed since Tim and Carla had arrived. Tim had been given a week off before starting work but that was so he could build a house. All of the

homes, new and existing now had a bathroom with flush toilets and hot and cold running water, electricity and a television receiver. The TV sets for the new arrivals would be issued as soon as they had been unloaded. All of the houses had cement beds that were raised up off the floor with air mattresses on top. All had cement chairs and tables with cushions on the chairs to make them comfortable. They all had cement chests with wooden drawers. These weren't the kinds of houses that people from Earth were accustomed to living in but they were functional.

The Company cavern community now had twice the population of the Government community and eight streets had been named. All of the houses had addresses. The Company cavern was beginning to look like a small city. What was lacking was a business community with stores and such, but that would come. An area had been left clear in the center of town for stores that would be opened by the private sector. It was interesting to note that once flush toilets had been installed the stench had gone away. The atmosphere control people had even started introducing a hint of fragrance into the air.

The material to equip and open the first private business was being unloaded from Mars Supply One. The Company putting in the business was taking a tremendous loss on the project, one that they knew they could never be recovered but that didn't matter, it was the publicity they were after. They had paid Mars Colony, Inc. one and a half billion dollars for the franchise rights to do business on a one hundred by one hundred square foot lot of leased space on a 20 year lease. For that amount The Company agreed to send six of their employees on Mars Supply One and another six employees on Mars Supply Two. Mars Colony, Inc. agreed to allow this companies employees all rights and privileges that they would receive had they been Mars Colony, Inc. employees, including the right to eat in the Mess Hall and the right to free medical care.

On the evening that the ship had arrived with the new employees Tim and Carla were home watching Rusty give the news on MARS-TV-Channel 2. Rusty came on the air and he was really hyped. "Good evening to all of you regular viewers and to you new arrivals also. As you know if you watch this news program on a regular basis I am usually hard pressed to find enough news in the community to fill my half hour slot but not tonight, I have three big stories that just broke today."

"First I would like to introduce you to our two new staff members here at MARS-TV, Folks I want you to meet Clark and Mildred Gibson. They are a married couple and will be working with our staff on our internet project. I know the Mars internet doesn't amount to much with fewer than one hundred web pages but hold on to your seats because here is what is coming in the coming month or so, are you ready for this folks, Earth INTERNET. Here is how it will work. There has been a relay antenna installed on the orbiter that circles Earth and one installed on the one that circles Mars and one each ship, Mars Supply One and Mars Supply Two, one of which is always en route from Earth to Mars.

Now since it could take anywhere from 4 minutes to 42 minutes for radio waves to travel between the two planets, depending on where Mars is in its orbit the delay on getting a command executed on the internet would be prohibitive, this is what we have worked out. Besides these two folks here there will be two more employees in Seattle. They will be searching the web and uploading all information websites to Mars on a full time basis. These two people here in the studio with me will be downloading what they send and putting those web pages on Mars internet. The new software that they are using on the Earth end will automatically pick up updates to any website that they have already sent and send all updates automatically. In addition to that we are making email accounts that you establish here on Mars, Earth active that is if you send an email to someone on Earth right now they should receive it within the hour and you could have your response within two hours or less. We are putting all Mars email addresses for every person and office on Mars on our Earth website and we are offering a free lookup service that you can use to obtain email address for any business, office or person on Earth that has an email address." Rusty then introduced and briefly interviewed the two new internet operatives.

"The next item concerns this young gentleman sitting here on my right. Tell our viewers, Bob do you work for Mars Colony, Inc.?" "No I don't Rusty, nor do I work for the United States Government. I just arrived here on the Colony today and I am employed in the private sector." "Why don't you tell our viewers what brings you to Mars, Bob?" "I am here to supervise the construction of our newest outlet. All of the equipment necessary to install our store is being unloaded from Mars Supply One as we speak. Our location should be up and operating shortly after Mars Supply Two arrives in about four months." "I think our viewers are dying to hear the name of The Company that you work for Bob." "Rather than just come right out and tell them I will give your viewers a hint, We will be located in the business section of The Company cavern and they will be able to easily find our location, all they will have to do is to look for the big red arches." "Do you mean that Burger Boy's is coming to Mars?" "Oh Rusty, you guessed it and yes I mean that Burger Boy's will be operating on Mars by the end of May."

"We are not through yet folks, I now want you to meet Abner Jacobs who is also a new arrival today and is an employee of the company. Just what kind of work do you do for The Company Abner?" "There is not just me but I brought along my wife Jennifer and another couple Dan and Sue Yang, we are what you might call farmers but we are specialized in grow light indoor farming. All four of us have masters degrees in Agriculture from University of Alaska, Fairbanks. We specialize in growing plants indoors." "We have everything that we need to get started farming a one hundred sixty acre parcel of land on the ship, including a new product that we designed from samples of Mars soil to best convert this soil to support crops, of course we also brought along adequate grow lights, fertilizers and seeds and farm equipment to get a farm in operation within a few months. From then on all of your vegetables will be fresh not canned. We will produce as a byproduct of the vegetables enough food for a

sizable heard of goats. The goats will provide milk, other dairy products and meat. Unfortunately Cattle can never be raised on Mars in any quantity, they release too much methane into the atmosphere. Around our crops area we will be planting a variety of fruit trees which will benefit from the grow lights on the crops and eventually produce fresh fruit. I think you will find that our crops are up to ten times as productive as outdoor crops on Earth that grow seasonally. Our crops grow constantly and are extremely productive. We will also be taking over care of your existing animals and will be augmenting them with a dozen young pigs that we have brought from Earth ” Rusty then introduced the other three farmers and interviewed them all together.

“I see that our time is up for tonight folks, I hope you have enjoyed tonights news as much as I have enjoyed bringing it to you. Stay tuned now for the nightly news with Keith Edwards Unfortunately this will still be 24 hour delayed.” Sue Yang had responded to several of the questions that Rusty had asked but Dan Just sat there without saying a word. Rusty asked Abner after the show if he had done anything to offend Dan. “Naw,” said Abner “I have been working with Dan Yang for seven years and I have never heard him say much.”

January 16, 2108: Tim had a chance encounter with Bob the Hamburger man and ask him how the deal went down that his company was given permission to operate on Mars when the Government and The Company were partners in the space ships and in the land they would be doing business on. “This is what I have heard Tim and mind you that I am not a member of top management of the company. Our company wanted to operate a franchise on Mars for publicity purposes back on Earth and Our company is one of the principals in Mars Colony, Inc. They offered two billion dollars to the Government and The Company for the following: The Mars ships would move all the equipment that we needed to Mars along with twelve employees. The employees would have the same benefits as your company employees and would be on a ten year contract just as, I assume you are. The Company would keep us supplied with food stuffs and supplies that would arrive an all future ships for the next ten years. The Company will construct our business building on a one hundred by one hundred square foot lot in your business district. That is about all I know other than there is not really any profit motive for Our Company but it will provide us with commercials for years to come. Oh there is one more thing, we will not be allowed to charge more for products here than the average price that we charge on Earth.” “That about answered all my questions, Oh yeah, when will the rest of your employees and your food stuffs arrive?” “On the next ship which is due in some time in May of this year, Tim, so I hope our building is ready by then.” “Are you kidding, with all the extra construction guys we have here now they could have sent the employees on this ship. We will have the whole thing wired, plumbed and ready to open in a week. Thanks for the information and I hope you enjoy Mars.”

January 17, 2108: Abner Jacobs was busy inspecting the corn crop at the temporary farm when a nondescript construction worker walked up to him

and handed him a small match box without saying a word. When Abner opened the box he noticed that it was about half full of little white seeds the size of BB's. Abner knew exactly what these were. Abner just smiled and put the box in his pocket. The construction worker smiled back and walked away, neither of them had said a word.

Abner walked out amongst the corn stalks and planted the seeds. He would need to transplant them once they had germinated but for now they needed to be in the soil.

January 17, 2108: When Tim showed up at work the next day Carter assigned him to pick out a crew of thirty workers put someone competent in charge and assign them to work for the farmers. Tim gathered the crews together and said "before you start work I need thirty of you to help get the farm set up. I think that prior farm experience might be helpful so if any of you have some farm experience and would like to work for the farmers for a couple weeks or for however long they need you please step over here by me." About twenty or so moved over behind Tim, "OK now any of you others who would like to construct the farm house the farm lab and the animal pens please form a group over there by the flag pole." Another thirty moved over by the flag pole. "Sorry folks but I only need ten of you so if you do not have plumbing or wiring experience please return to the main group." The thirty of them began discussing the matter then all but ten moved back to the main group. "Now you work group leaders take note of how many men you have lost and get together with the other work group leaders and shuffle people around until you have the number you need to go to work on what ever project you were working on last."

That only took five or ten minutes and everyone was happy, Tim liked that management style. He allowing people work where they considered themselves to be most valuable to the project and where they would be happiest. Maybe this management style wouldn't work with the class of people that you have working construction jobs on Earth but it sure works out well here. Tim addressed the two work groups and said "The new farm is going to be just over the bridge at the back of The Company cavern. The area is a little over three hundred twenty acres but will help keep the farm and animals all in one place. It will also leave plenty of room for the house and barn and lab. I think you might have to wall off the generator to keep the noise from disturbing the farmers and the animals. Other than that the rest is up to the farmers. Put everything where they want it and do everything they ask of you." About then Abner and Jennifer showed up and Tim gave them the layout. "We think the farm should have this whole area from the river and lake to the back wall of the cavern." Tim told them. These forty construction people will do what ever you ask of them to help in getting the farm set up and equipped. These thirty have some farm experience, the other ten will construct your buildings. At that point he introduced Abner and Jennifer to the workers and then said "Go to work." Tim stepped back and saw Abner begin talking with the volunteers explaining everything that he would need to have done. One of the construction people asked Abner to come with him. He would show them where to find the tools

and equipment they would need in the supply yard. "All of it may not be unloaded yet but we can take what there is and start moving it over to the farm.." Before Tim left he told Abner that if he needed anything or if he needed more help with a big job to let him know and he would send more workers. It now seemed to Tim that workers were the only thing on Mars that was not in short supply.

There were other things that had been provided for the farm, the most important of which was six large box hives of honey bees to pollinate the plants and to provide the colonists with fresh honey. There was also an assortment of caterpillars and even four small mulberry trees that were covered with silkworm cocoons when the ship left Earth but by the time they arrived on Mars the cocoons had hatched into silkworm larva.

Shortly after Tim left Abner was unpacking packets of seeds when he came across a package of seeds labeled Ivy. Abner didn't even know there was such a thing as Ivy seeds. He tore open the envelope and found, not seeds but tiny dried roots. Not knowing what else to do with them and failing to appreciate their benefit he scooped up a shovel full of fertile soil and planted them in the corner where the generator wall met the cavern wall. By the next day Abner had forgotten all about the Ivy. Seeing the fertile soil and noting the depressions Abner had made with his finger when he planted the roots Sue Yang shrugged, went over to the lake, scooped up some a bucket of water and poured a little on the spot, figuring Abner was trying something and had been distracted before he had watered it. The next day Sue Yang poured a little more water out of the bucket onto the soil. By the time the bucket was empty there were little green shoots sticking out of the ground. The odd thing about this was that there were no grow lights shining directly on the area where the shoots were coming up just the ordinary cave lighting and where these plants were coming up there wasn't even much of that. Sue Yang then went and got Abner and showed him the shoots. "These shoots are growing without the benefit of grow lights, Abner, whatever you were trying here worked, congratulations." Abner had to pause and think just what he had planted there, then he remembered the Ivy. "Oh, yeah, Sue, I thought I would try some Ivy, there was a package of dried Ivy cuttings in among the vegetable seeds that I had ordered rather than to just throw them away I stuck them in the ground over here then I got busy and forgot all about them." "Do you realize the significance of this Abner? We have come up with a plant that we can grow anywhere in the caverns. True you can't eat Ivy but you can sure breath it's byproduct. Ivy spreads like crab grass so if we were to plant it everywhere it would grow everywhere. It is nice to look at and the plants will enrich our atmosphere immensely once they take hold." Abner called Tim and asked him to drop by the farm next time he was in the area.

CHAPTER - Planning the March to Utopia

January 17, 2108: That afternoon when Tim returned to Carter's office there were three construction workers and a couple Government scientists going over some drawings on Carters desk. "Tim, take a look at this. The big cavern which I think we should start calling Utopia for now, is about six miles from this wall in the Government cavern. There are smaller caverns along the way that we are going to have to secure and pressurize before advancing and the way I see it we are going to have to tunnel for up to two miles. Our biggest problem is that these caverns are not all on the same level. See this long narrow cavern right here it is deeper than the others but once we reach the floor of this long slender cavern right here it will enter right into Utopia on the same level. so it looks like we are going to have to tunnel down to that sliver before we can continue. Setting the downgrade into that cavern will be a real problem. We will have at least five, maybe six smaller caverns to secure and pressurize before we reach Utopia .

How long do you estimate it will take us to dig two miles of tunnel Johnson?" "Let's see" said Johnson, "if we can complete one foot of tunnel per hour average it would take roughly ten thousand hours, that would be about seven months of continuous tunneling if we worked around the clock. That could vary considerably depending on soil conditions and problems that we might be encountered in sealing off the small caverns that we go through. We have six hundred workers now and can expect at least three hundred more before we reach Utopia

. "I would say that our tunneling crews would have to work in Mars suits a lot of the time. Of course once a new cavern had been pressurized they could headquarter in that cavern. The men will need 24 hours rest after working eight hours and we will need eight men working at all times so that would mean a tunneling crew of 32 men. All things considered I would say we will reach Utopia in one to two years. At least that gives a workable time frame."

"Once a tunnel is opened it will need to be enlarged. We will need four more crews of eight men each for this job. They should not start work on a tunnel until the tunneling crew has moved on to the next tunneling job so they do not get into each others way. The crews doing the enlarging can use the dirt they remove for top soil at the farm or for fill dirt in leveling the caverns. The tunneling crews working for breakthrough will be digging approximately eight foot by eight foot tunnels, the second crews will be enlarging the tunnels to 25 feet wide by 20 feet high."

"Your next Fossum, how long will it take to seal off the small caverns and pressurize them? "Does your chart show how many fissures need to be sealed between here and Utopia, yes there is a count here for each cavern and a total of up to one hundred fissures but that is only an estimate. There average width on the chart appears to be three or four feet. "I estimate that a crew can seal one fissure per day. That takes into account that the workers can not be exposed to the surface for more than two hours at a time. All things considered

there is probably three to four months work there if we have the materials and if we could only have one crew working at a time.” “Why don't you explain how you go about sealing a fissure, Dave.” “We locate the fissures that need to be filled by placing a bright light in the cavern then going out after dark in Mars suits and making a visual observation of where the light penetrates the surface. Then we flag the location so that we can find it the next day. To plug the hole we dig out around the fissure, usually an eight foot hole and down three or four feet until we hopefully hit bedrock. Then we lay in an eight foot piece of circular one inch tempered plywood. We then mix the concrete and pour it into hole about eight inches deep. When the concrete has cured we lay down eight foot long pieces of rebar, criss crossed and wire the joints together. we pour fresh concrete about one foot thick then when that has cured we lay on another course of rebar followed by another course of concrete. The rest we just fill with Mars soil until it is level with the surface.” This will take a crew about eight hours in working time but they can be working on other fissures while the cement is curing. Also keep in mind that when the winds come up on the surface we can't do any work outside. Twice a year for almost a month at a time the winds are too strong to do any work on the surface. There will probably be times when opening one of the caverns will be delayed for a considerable time waiting for the wind to die down.”

“How about installing and moving the air locks can one crew keep up, Johnson fielded that question, “That is a definite yes but they would be kept busy. As long as we have plenty of workers we should probably assign two crews. One crew can set the small temporary locks while the other can set the larger permanent sliding air locks once the tunnels have been enlarged. Can our system handle the load of pressurizing that much new space. “Certainly not all at once but if we only had to do one small cavern per week the answer would be yes, We have some old oxygen making equipment over in supply that could keep the atmosphere breathable without running any risk at all. Lets say we can handle the atmosphere problem throughout the whole system as we go but none of what we have said so far applies to Utopia .”

“If any of the small caverns turn out to be larger than anticipated then we will install additional atmosphere apparatus along the way. While we are at it we might as well have several more systems on order. We do have three backup systems in the supply yard now but it is important that we always maintain twice as much atmosphere equipment as we need so if we have an equipment failure we will still have atmosphere. We could install the new systems as we go and keep ordering more back up systems from the Company. Actually the more area that we are providing atmosphere for the safer we will be. We should discuss our needs in this area with the government employee who handles the atmosphere now and assign more workers to that function. If they are not needed on a given day he can release the workers to perform other work until he does need them but they should all be trained to install and maintain these systems. When we reach Utopia we'll need several new systems to maintain atmosphere in a cavern that large. I won't know just how

many until we get there and I make some calculations.”

As for our maps and our estimation of the size and shape of the caverns we will be going through keep in mind that this information was gathered several years ago by flying over the area and taking infrared pictures. For a number of reasons they may not be completely accurate.

“How many men can we spare now to start digging?” “With all of the problems that I know we will encounter, my estimate is that we will need, fifty or more. That would cover all of the support operations. I suggest that today we select who we want on our tunneling crews, gather our equipment and start them out in the morning under Johnson's supervision. Our first tunnel is going to be a little over eight hundred feet long, we have plenty of people and we can work them four hours on and 24 hours off. We won't need to set the air tight seal until they are in seven hundred ninety feet. Then we will set the door and the men will have to start working in Mars suits for the last ten feet to breakthrough.”

Johnson and Tim spent the rest of the day going over lists of employees and picking out the men that they wanted on the first four crews. The men were notified by cell phone that they would start tunneling the next morning. They were then asked to join Johnson in the supply depot and start locating all the equipment they could find. A concrete block wall was erected in front of the tunnel site but set back 20 feet to give the men room to work. The electricians ran power over to the site and trenches were dug to catch the debris. Any of the soil removed would be moved to where the farm was being set up. The farmers could use it to make topsoil or the crews could use it in the wall that would run along the river to protect the lake and stream from being contaminated by the crop runoff.

January 19, 2108: Among the cargo items unloaded from Mars Supply One was the new equipment for processing human waste. As soon as Carter saw it and read the setup manual he set two crews to installing the equipment. One of the Scientists looking over the equipment decided that the machine would fit in the small cavern attached to the Government cavern that had been used as public bath rooms. Once it had been installed men drilled a four inch hole down from the surface and attached a power vent. Then put an air lock on the door leading into the Government cavern. When the machine was in use they would shut the air lock and work in Mars suits until they had finished processing the waste matter.

The machine separated the matter into three parts. The liquid was processed through reverse osmosis equipment and then allowed to run off into the crevasse where they had been dumping everything. The non biodegradable matter, ie the plastic porta potty liners or any other non biodegradable matter that had found it's way into the sewer system, were compressed into bricks and spat out the front of the machine where workers stacked them to the side of the cavern. The machine then processed the biodegradable mass which came out as a kind of mulch which was odorless

and and only slightly damp. All harmful bacteria had been removed but the mulch was still rich in nutrients. The men captured this material in large plastic garbage bags. Once the machine had finished processing the batch for the day the crew turned on the power vent to the surface and opened a vent pipe that ran along side the air lock. It only took a few seconds to exhaust all the stale air in the cavern. Once the air was clean they could they would close the vents and inject a strong ammonia based deodorant into the small cavern and open the air lock. It took three men working in Mars suits about two hours per day to process the waste. The result was about five hundred pounds of fertile mulch and thirty or so plastic bricks that could be very valuable as light weight building materials.

The mulch was taken over to the farm where Abner could combine it with mineral nitrates and other fertilizers before it was mixing it with Mars dirt to make top soil. Abner would soon need lots of top soil.

This daily processing chore was considered to be an undesirable job. There were plenty of volunteers when they learned that they only had to work about a four hour day.

January 20, 2108: The farm was coming along nicely. A large farm house, lab and barn were being constructed. This would be the only house on Mars with a fully functional kitchen, two bathrooms and four bedrooms. The reason for the four bedrooms was that both couples had indicated that they were probably on Mars to spend the rest of their lives and both couples intended to start a family. Tim really liked the farm couples and it got him to thinking about how they were making a commitment to live out their lives on Mars after only being here a few days.

Tim asked Abner "What was it you said you wanted to show me next time I got over this way" "The Ivy, Tim, The Ivy, look at this stuff." By then the little green shoots were up almost half an Inch. This stuff is like a weed, it will grow anywhere even in ordinary cave light, it looks pleasing to the eye, especially against these stark cavern walls and it will improve our atmosphere, or at least take some of the load off our atmosphere apparatus." "Sounds good but maybe we better discuss it with the scientists before we start spreading the stuff around."

That evening Tim and Carla had a long talk. "How do you feel about Mars now Carla?" "I like it so far, it seems more vibrant and alive and it certainly has a low crime rate. The work that I do is the same as I was doing on Earth but the people are nicer to work with and the way The Company bends over backward to provide us anything we ask for is wonderful. The only thing that bothers me is that my biological clock is running and I would like to start a family. We could start one here on Mars but there would be fines and penalties, you know." "I want a family also Carla, in a little over a year we will break into Utopia Cavern and even if it takes two more years to seal and pressurize, we are still looking at living in Utopia when our kids start school."

“There we will have regular streets, with electric cars darting around, we will have schools and churches and businesses. Bob told me that one of the other prime investors in Mars Colony, Inc. is the family that owns all the biggest store chain on Earth but they want to hold off opening up on Mars until Utopia is ready”.

“OK Carla, no more contraceptives. This is our home now and I love the place. When our contract is up we can either renew once or stay on Mars and go into business. I already know that The Company and Government are going to sell off most of the real estate in Utopia to developers, businesses and private citizens. If things go as I see them going we will be in on the ground floor of the nicest city in the solar system. Besides I think I would have a lot more difficulty in adjusting to Earth gravity than I had in adjusting to Mars gravity.”

CHAPTER – Earth is having problems

Never in history had the difference between the developed nations and the third world been so pronounced.

Nuclear proliferation treaties had not been effective. There were, by the year 2100 more than sixty nations on Earth that possessed nuclear weapons. Some had delivery systems and some just relied suicide bombers that carried some sort of nuclear device in suit cases.

Around 2050 coal liquefaction had been perfected to the point where 100% clean burning, non polluting liquid fuel could be made from coal. Many countries on Earth that did not have petroleum had enormous coal reserves. There was no longer any demand for petroleum or products made from petroleum.

Lithium Ion batteries had been perfected and powered all transportation equipment, they could be recharged in under ten minutes.

Canada and Australia were the only two remaining food exporting countries. All the other developed countries had to scramble to keep up with feeding their own burgeoning populations.

So many people in the third world were dying of malnutrition and starvation every year that the total population of the planet peaked at nine billion and had begun to recede. Many of these third world countries had acquired nuclear weapons.

With the loss of oil revenue the middle east had become even more of a powder keg. Because of the wealth created during the years when petroleum dominated Earth's fuel needs there remained several thousand people in the middle east who had a net worth in excess of fifty million dollars. The rest of the people living in the area lived in disparate abject poverty. Death from

malnutrition and starvation numbered in the thousands every day. The very rich managed to place the blame for the unfortunate circumstances of the poor onto the developed nations. Jihad was more popular than it had ever been. It was said by one Western Philosopher of those in the middle east who had not died of starvation, "Hatred of the West was the only thing that was keeping them alive."

Africa had not fared as badly as you might imagine. Disease and hunger had taken so many that the land was beginning to recover. The Africa of 2107 once again began to resemble the Africa that the White Man had first visited seven hundred years earlier.

The story in Asia could be summed up in one word, overpopulation. During the twenty first century many Asian nations had pushed their way to the forefront in the areas of science, industry and world trade, only to fail because they were unable to control their growing populations. No matter how industrious they were they just could not feed all their people.

This was the situation on the planet Earth in the year 2107. The international situation had become a ticking time bomb.

CHAPTER – Swap Meet and Currency

January 21, 2108: Back on Mars work had started on the first of the new tunnels and had progressed smoothly. This first tunnel would run eight hundred feet.

The new arrivals were extremely qualified people with a good attitude. It was difficult for Tim to find enough work to keep them all busy until they made the first breakthrough. The air lock had been set where the dig had started. The dig had not turned up any new diamonds but they were finding many semiprecious stones that would make great jewelry.

SWAP MEET

A lot of people had accumulated things that they no longer needed or used so they decided to hold the first swap meet on Mars. It was really a kind of pitiful beginning to what was to become a Martian tradition. Surplus personal property would always be in short supply even after stores began selling merchandise. There were dozens of vendors and hundreds of buyers but everyone needed change for a \$100.00 bill.

CURRENCY PROBLEMS

Most people had plenty of cash and no place to spend it. Making change was a problem for those buying or selling anything. Most of the cash was in large bills. There was a real shortage of small bills. Almost no one missed the

coins because nothing on Mars would be sold for odd change for a while yet. At least not until Burger Boy's opened. Bob told Tim that when the next ship arrived he would have three million Dollars in change but that wouldn't be until May. Until then people were just writing out IOU's and signing them. Then that person would pass the IOU along to someone else and sometimes the IOU that someone had written would find its way back to the one that wrote it. Some people kept track of their outstanding IOU's and some didn't. Everybody took IOU's willingly because that was about the only medium of exchange other than large bills. People began to get concerned about all the money they had stashed in their unlocked homes.

CHAPTER – A bank is organized

February 5, 2108: Alan Jeffery, and Remar Otton two of the men who had completed their Government contracts and remained on Mars as private citizens decided that they had just figured out the perfect small business to go into. They arranged through Thelma to lease a lot in The Company cavern business district right next to where the Burger Boy's building stood. They went to work building a store front with their own hands. They were able to negotiate for and acquire from the Government a surplus safe and a good supply of rebar reinforcing rods used to reinforce concrete. They paid a couple of men that worked as welders to come over and weld a metal frame on all four sides of their store front then they used Mars cement to cover the walls. Outside the walls they stacked the usual cement blocks and when they were finished they bought enough scrap metal to have a front door welded together and hinges made. When they were through they owned the most in-penetrable building in the colony. They then told Thelma and Walter that wanted some kind of charter making their business legal. There was a lot of consternation all around but they finally got their permission from The Company and from the Government. The First Colonial Bank of Mars was open for business. The money poured in, they soon had over two million dollars on deposit in their safe. They did not pay any interest but rather charged their customers a small fee for the service of safeguarding their money. They were able to acquire some surplus computer equipment from the Government and started printing checks which were really just IOU's in small amounts and selling them at the bank.

“In case you hadn't noticed Alan we don't know diddle squat about running a bank.” “I realize that Remar, but we are both intelligent men and we can learn.” “Here is what I propose, lets advertise and hire an agent/consultant on Earth that does know about banking. We can then have him locate a correspondence course from some banker training school that will be willing to email us all of our study material and send up the most important books on banking on the next supply ship”

They both approved of that plan and emailed an ad to one of the New

York newspapers to run in their Classified section under help wanted. They were flooded with emails which they read aloud to each other then selected the three best qualified and sent them an email requesting a full resume. They eventually settled on the best qualified candidate and hired him for just a nominal consulting fee. They then found a qualified detective agency and ran a thorough background check on the man. He came out squeaky clean. Then the email started flying back and forth from them and their consultant.

Their agent had spoken with one of his old professors at Harvard University school of business who was willing to undertake educating them via email. Shortly study plans began to arrive by email. They had a lot of time on their hands so they started knocking out the lessons at a record pace. Within six months they had the books that he had sent up on the supply ship and were both becoming banking experts. They had their agent pick out a good selection of banking business equipment and had that sent up. They began to offer more services at the bank. They arranged a form that their clients could sign directing that all future payments for wages were to be deposited in First Colonial bank. Since they had all the latest banking equipment they had to add on another room to the bank. They found two women on Mars who had once held responsible positions in banks on Earth and persuaded them to come in after working on their regular jobs and handle the paper flow at the bank. They had established a correspondent bank relationship with big name stock and bond brokerage firms and with the largest bank in the United States. Things got a little sticky when they applied to become an FDIC member bank. There were just so many things about First Colonial that did not fit the FDIC mold. It took them almost six months but with the help of two U.S. Senators finally began to print on the bottom of all their forms the magic words "Member FDIC" They could now exchange bank drafts with their New York Correspondent bank and employed a trust officer at their correspondent bank to temporarily handle investments for their bank. They knew that as soon as there was a demand for borrowed money on Mars they would be financing that development through their bank but until then the money would be earning a good return invested on Earth. At that point they began to pay interest on deposits and more money poured in. The workers on Mars liked having their nest eggs on Mars where they could keep an eye on them. By the time Utopia was sealed they hoped that their little bank could justifiably claim that they were holding over one billion dollars in deposits.

The Agent that they had hired in New York had no interest in moving to Mars but he recommended a young man that had excellent credentials. First Colonial hired the man and his wife, bit the bullet and paid the one million dollar fee to have them moved to Mars. When Abe and Lilly Schuman arrived on Mars the bank began to look a little like and operate a lot like a real bank. Lilly was installed as the head teller and cashier. Abe was given the title of Manager, Abe also took on the duties of loan officer. Allen and Remar ended up doing pretty much what Abe told them to do.

With the arrival of the second ship after opening the bank they received

two million dollars in ones and fives which they promptly made available for circulation on Mars. They bought the bank drafts that they had sold with small bills. In the meantime when the first ship arrived after opening the bank Burger Boy's had received their three million dollars in change which they deposited in the bank so now there was more money in circulation than they would need until Utopia opened up. The people on Mars tended to think in terms of all progress and development as "When Utopia Opens".

Paul, Tim and Carla thought it was a godsend having the bank here because since Mars wages were not taxable the IRS paid little attention to transfers of cash to and from banks on Earth and First Colonial Bank on Mars. Long before Utopia opened Tim and Carla had over a million dollars on deposit. The bankers were happy because they were the only bank in the system that didn't have to anticipate the arrival of inspectors from the FDIC, although they were a member bank it was just too damned expensive to send an FDIC inspector up to Mars to inspect or audit First Colonial. Neither the FDIC nor the bank wanted sensitive information traveling back and forth by email so they were largely left alone. It also might be noted that the FDIC had little doubt about the solvency of First Colonial Bank.

CHAPTER – First Breakthrough into Paradise

February 10, 2108: The drillers broke through into the first of the new caverns. The Talk Show host on Radio MARS interrupted all the music stations "Guess What Folks, We have a breakthrough. Stay tuned to your talk radio station for all the details."

There was much fanfare in the community. Special meals were served and there was a general celebration. That one thing was still lacking but they managed to make a gala day of it anyway. The day of the breakthrough Thelma declared a holiday and gave everyone the rest of the day off, except for the cooks and a few other key people. It really wasn't all that great to have the rest of the day off, it was almost quitting time anyway.

When cavern was opened the workers were taken aback by it's awesome beauty, unlike the existing caverns it was populated by stalagmites, stalactites and majestic columns. It must have been broad daylight on the surface of the planet because the effect of the sunlight trickling through the fissures was gorgeous.

Stalactites are formed by the deposition of calcium carbonate and other minerals, which is precipitated from mineralized water solutions. The corresponding formation on the floor underneath a stalactite is known as a stalagmite. Given enough time, these formations can meet, resulting in a formation known as a column.

Loud noises and voices created echo's that vibrated off the walls. There

were several flowing rivers and streams and magnificent little lakes dotted the floor. The cavern was only one mile wide where they were crossing but faded off into the horizon at both sides as far as their most powerful portable lights could penetrate. Subsequent measurements indicated that this new cavern covered 14 square miles at floor level. Tim, standing there awe struck, in his space suit knew that this was to be a national park and first class recreation area. It was as close as you could get on Mars to a forest. Later that day when they were back in the Government cavern Tim described it to Carter, Thelma and Walter. Tim then took the three of them on a guided tour of the cavern. They took along a lighting crew with the best portable lights available in the colony. Thelma remarked, "This place looks like paradise." "So it was that Paradise Park got it's name."

In their exploration of the cavern, up against one wall they came across a small cave. In front of the cave they found the remnants of a fire pit. On further examination of the site they found a dozen or more petroglyph's depicting a hunt. The hunters all had two arms and two legs. The animal they hunted looked like a cross between a bison and an elephant.

"This is fantastic, do you realize that we are looking at the first evidence ever found that proves that manlike beings inhabited this planet at some ancient time.

Walter immediately tried to call someone on his cell phone but there was no service available. They scurried back to the Government cavern and Walter placed his call. The scientist who answered, upon hearing what they had found, called six or seven other scientists and a photographer. Walter told the lighting crew to take a break but remain where they were.

An hour or so went by before seven people in Mars suits approached from the Government housing area. The entire party returned to the place where they had found the artifacts. The scientists were ecstatic. You could just sense that this was the reason that they had signed on to work on Mars in the first place was the hope of finding something like this. They had the photographer take dozens of pictures from every angle then they took samples of material from the fire pit for carbon age dating. At that point Tim, Carter, Thelma and Walter took their leave. "This place seems to be in good hands so we are going to have dinner, Thelma informed them. The scientists hardly noticed their departure.

After dinner Tim went over to MARS-TV and told Rusty about the find and the cave. Rusty had already heard about the find but hadn't had time to go inspect the site for himself before he had to go on the air with the local news. He invited Tim to stick around and be his guest on the show. Tim was a little uneasy being on camera but he stayed and described what they had found to the entire community. "For the first time the news from here is going to dominate the news on Earth for quite a while." he told Tim after the show. "I am now going to grab a photographer and get some pictures myself and then get this on the internet. We are going to be famous, Tim." Rusty sounded so

excited that Tim had to smile.

For the two days following the discovery all of the networks on Earth did carry Tim's description of the find. After that they started carrying the opinions of Scientists and Mars management people. After about a week an important political assassination occurred in Germany and the media moved on to greener pastures.

In the months that followed they would seal and pressurize the remaining caverns en route to Utopia . They had already chosen the name of Cavern City as the name of the Capital City to be built in Utopia.

February 16, 2108: The crew started tunneling the next tunnel and it was to be a whopper, 940 feet with an offset to the right. The work was miserable because they were still working in their Mars suits. No one liked working in those Mars suits. The temperature in the unpressurized cavern was just above freezing but the suits were heated and well insulated. It was just that they were so clumsy to move around in.

A week went by and the tunnel was in about one hundred feet when one of the workers summoned the crew chief. "Joe here is acting funny, you better get him back to the clinic and have the doc check him over. Two men lead and then carried Joe back through the airlock then got him out of his suit. By this time he was unconscious. They carried him to the clinic and the doctors dropped what they were doing and went to work on him. Dr. Rivera immediately took over the case. "Thanks, Guys we will give him a complete examination and try and work up a diagnosis but in the meantime I suggest that you have your crew chief get everyone out of that cavern and out of their Mars Suits until we know just what we are dealing with here.

February 17, 2108: Tim heard about Joe's mysterious ailment on talk radio. The next morning after breakfast Tim stopped by the clinic to see how Joe was getting along and Juan told Tim that he had passed away shortly after being brought in. Juan also said that another member of the community had come down with the same ailment. The good news was that this person was working on the surface in a Mars suit. Joe's autopsy showed that he had died from inhaling Carbon Dioxide. Dr Rivera scanned the new patient for signs of Carbon Dioxide poisoning and bingo he was suffering from the same thing. They then tested the Mars Suits these two men were wearing and they tested OK. "We think you have been inhaling Carbon Dioxide and that is why you are sick" Dr. Rivera told his patient. "No honest Dr. I didn't breathe in and I had my helmet off for less than a minute." "Why, in God's name did you take it off in the first place Mr Salva?" Because it was closing in on me, I just couldn't resist taking it off for just a few seconds and I didn't breathe in while it was off." Mystery solved, he had his helmet off for less than a minute while he held his breath then when he put it back on he had to take a deep breath before the suit had a chance to clean the Carbon Dioxide out of the helmet. Tim put out a memo to all personnel wearing Mars suits in unpressurized atmosphere, that if you became overcome with claustrophobia while wearing your suit, no matter

how Inconvenient it was return immediately to the nearest pressurized atmosphere before removing your helmet. He explained that they had recently had one death and one serious illness from workers doing this. Once Tims memo and the grapevine word of mouth got out then they had no more problems with this mysterious affliction. Talk radio discussed little else that day.

February 25, 2108: The eighth day of tunneling. They ran a pressure test and Paradise passed with flying colors. Late on February 26 Paradise had been pressurized and atmosphere was introduced. Tomorrow the men could work without suits. If there was a breach they would have plenty of time to dawn their Mars suits before the atmosphere all escaped.

February 26, 2108: The crews assigned to enlarge tunnels went to work on the first tunnel, the one that ran from the government cavern to Paradise. Tunnel enlarging proved to be a more time consuming task than digging the tunnel in the first place. Much of the work had to be done by hand and wherever they found the walls or ceiling of the tunnel was of loose material it had to be concrete reinforced. What worked best was having three crews at a time working on enlarging and stabilizing the tunnels.

When the crews finished enlarging the tunnel it looked very professional. It had a paved highway for a floor that allowed for two lanes of vehicular traffic. Everything that needed reenforcement had been reinforced with concrete and rebar. The surfaces were all smooth and the tunnel was lit with a bank of lights that ran down the top. There was a pedestrian walking path on one side with additional lights spaced four feet apart. The largest power equipment on Mars could easily navigate the tunnel once it had been finished.

March 1, 2108: Tim, Carla, Juan and Lupe were becoming fond of Mars sports and looked forward to a game of shuffle board every evening. The four courts in the government cavern were adequate for the three hundred people that were on the planet before Tims group had arrived but it seemed as though recently they were always busy in the evenings. Tim and Juan finally gave up waiting for a court after an hour. Tim checked around and found that the croquet courts the situation was the same.

March 2, 2108: Tim discussed the matter with Carter before morning muster. "Carter we need more croquet and shuffle board courts, the ones we have are always busy, I was thinking that there is plenty of room in Paradise for such facilities as well as an additional gymnasium. If you have any surplus crews could some of them be assigned to constructing a new recreation facility?" "Never volunteer Tim, you just found yourself a job. Once you have the new facility functioning you can dismantle the old facilities in the government cavern. I think we have some extra equipment for those sports in the supply yard but you will probably have to order additional equipment from the company."

After muster Carter and another man accompanied Tim to Paradise cavern. "Carter, look at this hot pool and this warm river, if this water is safe

perhaps the people could use it for relaxing baths and if that stream is safe maybe it would support fish. We could always breed the fish in enclosed ponds then move them to this stream once they were too large to fit through the exit mesh. That would give us two uses, we could go fishing when we were off duty and we could harvest the fish for the mess hall. We could also raise fish in the river and lake in The Company cavern now that it is heated." "The fish for The Company cavern are already halfway here from Earth.

Carter walked up. "Frank here and I were just coming to inspect the pool. Frank has his water testing kit with him, any more great suggestions?"

"Yes this where I would like to put the new recreation center and gym, that way we could incorporate the hot pool with the other recreational facilities." "Suits me Tim, we could end up with a first class facility here."

At muster Carter asked for volunteers to move and enlarge the sports center to Paradise. Fifteen people that were not working on anything else at the moment volunteered. Carter then announced that until further notice anyone who had run out of work should report to Tim in the Paradise cavern to see if he needed any additional help.

Tim decided to put the new recreation area on the other side of the parking lot by the spa. The new gym would be integrated into the recreation area. Paradise was rapidly becoming a recreational facility.

At least once and sometimes as many as three times a day Tim would get a phone call from Carter asking him to check on the progress of the tunneling crew and find out if they needed anything or Carter might ask him to check on the tables in the dining room, there had been some complaints of benches that did not feel solid when you sat on them, or Tim would be asked to check up on the cement block production on the surface. One thing after another Carter was asking Tim to handle for him and Carter was seldom seen out in the field. He could always be found in his office, knee deep in paper work.

On several occasions Carter had asked Tim to handle the morning muster. He had a clever way of asking, he would start the phone conversation after Tim answered by saying, "Here is what I need to have you do when you call muster in the morning, Tim," then Carter would start listing everything that he wanted Tim to do." Tim was becoming Carters assistant by default. Carter just kept putting Tim in charge of projects.

The recreation center turned out to be a bigger job than Tim had anticipated. At times Tim had as many as thirty five people working on the project. Tim was constantly being called away to handle some pressing matter for Carter. Tim divided the people working on the project in Paradise into two groups then had the crews pick a crew chief for each crew. Tim delegated responsibility to the crew chiefs to handle things when Carter had him out doing other things.

May 15, 2008: "This is looking really great Tim, what do you want me to work on today?" "I am sure that we will think of more things as we go along Rob but for now we have about completed everything that I had on the plan that Carter approved. Besides the spa and the warm river we now have a nine hole chip and put golf course, ten shuffle board courts ten croquet courts and ten horseshoe pits. There are even public bathrooms and a new gym. We need more equipment but it's all on order."

No longer did people say, "let's go over to the Paradise cavern," now they just said, "Let's go to the park."

May 16, 2008: Abner was inspecting the Paradise cavern. All of the improvements had been made in the large center and to the left of where the tunnel entered. That was the beautiful part of the cavern. He noticed that beyond the tunnel entrance and off to the right the ceiling dropped off sharply. There was, at the far end, off to the right an area of approximately two square miles where the ceiling ranged in height from forty to fifty feet off the cavern floor. The floor was almost level. There were no stalagmites or stalactites at this end of the cavern. There was a stream of cool clear water dividing the area down the center. Abner got the picture instantly. Here was the future home of the orchard. At the far end of the area, the approximately one square mile that lay behind the stream the air temperature was noticeably warmer. Here, he thought would be the place where he would raise tropical plants.

Abner got on the phone and asked Tim "Where are right now, good buddy?" Tim said "I am over doing some finishing touches to the recreation area." "When you finish there would you mind skipping down to the small end of the cavern, there is something I want to show you."

"This is what I have in mind for this area, Tim." Abner then went on to explain his vision of the orchard and the tropical plant farm. "Here is what I propose, Tim, lets build another farm right here in this two square mile area, another farm house, barn and everything. The Yang's could move over here and tend these plants. The job has gotten too big for the six of us at the old farm already. I have been thinking of asking you to assign more permanent people as farmers but I didn't know where to house them. It is important that the people working full time on the farm live on the farm. What I would like to see is four people to take the Yang's place at the old farm, that would give us a crew of six full time permanent farmers. Then we will need four more people to live here on this side with the Yang's and tend the orchards and the tropical plants."

"Do you already have people in mind to fill these jobs, Abner?" "As a matter of fact I do, I have kept a close eye on the people that you have detailed to the farm since it opened and I could give you the list of names any time you want them." "You can give me the list today, right now if you like. Figure out how many people you can keep busy for the next month, let me know the number and the skills you need and I will assign them to you in the morning at muster. You can keep them as long as you have work for them. Surplus labor

is my biggest problem right now. It goes without saying that I will need Walter, Thelma, Carter and George to consent to the project and have a scientific crew approve it for environmental impact but I know already that I will get approval and the scientists are also looking for projects. I can get some of them on it today.”

Tim was delighted to have this project. It gave him something for the people to do. He put a call in right then for Carter, Walter, Thelma and George to see if they were available. They were all available and said they would meet Tim and Abner there in less than an hour.

While they were waiting Tim and Abner explored the area further and made several more suggestions to each other.

Once they had all arrived, Tim and Abner showed them the area for the proposed project and described the ideas that they had been kicking around. Everyone seemed thrilled with the idea. George said “When the other scientists and I were looking at the cave find we made a quick pass through here and one of the other scientists had remarked, 'this is where we should have put the farm' I am sure you will have no objection from the environmental establishment.”

Within two hours it was a done deal. There were quite a few items that had to be ordered from the Company but they would arrive in December when Mars Runner made it's first call on Mars.

May 17, 2008: At muster Tim called out the names of the eight people that Abner had given him. They were four married couples. Tim knew they were all anxious to work on the farm full time but he asked them anyway, just for the record. Tim suggested that they work out the living arrangements with the other farmers. Of course they could not move in until the new farm house was completed.

Tim then asked for the 100 volunteers that Abner had said he could use and assigned them to the task of building the new far for as long as they were needed.

Abner told the group at muster that within less than four years Mars would be producing most of the food consumed on Mars including bananas, pine apple, coffee and coconuts. There was one more big food group to go, grain. They would find the ideal spot but it would have to be in some yet unseen cavern.

CHAPTER – Tims promotion

May 20, 2008: Carter and Tim were having a cup of coffee at the mess hall that evening while Tim was waiting for Carla to finish. Carter said, “Tim how

would you like to have my job as Superintendent?" "Sure but where would that leave you Carter?" "The reason that you have been running all the operations for the last few weeks is that I have been evaluating how you were able to handle the job. No one other than me knows this but Walter and Thelma are leaving Mars on the Next ship. You are a relative new comer to Mars but you have performed perfectly. You have done everything that I have ask of you. All I have to do is give you instructions in generalities, and never have I had to spell out the specifics of what I wanted done. I have been offered Thelma's job by The Company and I have selected you to take my job as Superintendent of Construction.

That means that when we reach Utopia it will be up to you to make the construction decisions. You have everything it takes, Tim, you have your engineering degree, your background is clean and I feel I can rely on you. The job is yours if you want it." Of course I want it Carter, I just don't don't know what to say".

"There is one more thing you may want to consider, you have mentioned that you intend to stay on Mars and have a family. As you know that you can buy your way out of your contract with The Company for five hundred thousand dollars but if you want I can get The Company to release Carla from her contract. This is a one time deal, it is not something that will be an option for you in the future but it can come now as part of your promotion package." "Let me talk to Carla about it and see what she says" Tim answered. By then Carla had finished her clean up work at the kitchen and approached them. "Carla, lets go home there is something we need to discuss."

Carla and Tim went Round and Round all evening pointing out the advantages and disadvantages of the offer. In the end they decided that Tim's raise to \$40, 000.00 per month would more than make up for her loss of Income and she could have a full time job at the bank working for Alan and Remar until they started their family. When she had to quit work to give berth to their first child she would not be fined. "I don't know anything about working in a bank, Tim." "That's OK, neither did Alan or Remar when they opened First Colonial. Now they are real bankers." So it was decided that Carla should be released from her company contract.

Tim picked Hal Johnson as his assistant. The man was so competent and knowledgeable that you just couldn't overlook him. The men all seemed to like him, maybe his only shortcoming was that he was not a visionary like Tim and Carter.

Alan and Remar were thrilled to have a real live employee that they did not have to pay air fare for. Carla told them, "I know nothing about banking or any other kind of paper work, I have been in food service since high school." "That was our situation but we obtained all we needed to learn from email exchanges with Harvard School of Business and these books here in our office. I propose that we first put you on a training program using the same materials that we used. I printed hard copies of all our lessons and I will feed them to you

as fast as you can absorb them.” We can't afford to pay you more than \$500.00 per week while you are in training but as soon as you start working we will pay the same wage you have been earning.

March 27, 2008: Carla began training for a career in banking. At first it was all very confusing and at times she thought that she would never get it. Then little by little she made progress. She got to the point that when she read something she could see how it related to something she had previously learned. Luckily she had already learned to touch type on a keyboard and use a ten key adding machine. After the initial shock she began to progress rapidly.

CHAPTER – Mars Supply Two Docks

May 22, 2108: The next ship arrived, Thelma and Walter announced their retirement on Rusty's nightly news show and announced that Carter Fredrick would be taking Thelma's place and that Paul Silverman would be replacing Walter Potts, as Facility Director .

That didn't set well with Tim, “I am the new Superintendent of Construction and Paul is the new Facility Director and we are in cahoots on a slightly shady business deal. We will never speak to Paul of this deal again. We will just take our money out of the Swiss account in periodic small amounts and forget I ever found those damned rocks, Carla.”

Tim, Carla Paul and Carter greeted the arrivals to Mars and gave them the tour. On the tour Tim pointed out the entrance to Paradise. He told them that this tunnel leads about eight hundred feet to the most beautiful cavern on Mars. The cavern is so beautiful that we have decided to set it aside for recreational purposes. Had you rather explore Paradise on your own after I show you around or do you want to tour it now?” There was some mumbling among the new arrivals but the consensus seems to have been that they would prefer to explore Paradise on their own. They were more interested, at the moment in seeing where they would be working, eating and sleeping.

There was only one real surprise passenger that arrived on the ship. Rusty introduced him as, “Charles Rasmussen, do you prefer Charles or Chuck?” Rusty asked. “I prefer Charley,” Rusty went on to tell the viewers that Charley worked for Super Stores. He was sent as a site locator for a new Super Store. “I am here to pick out a site for a temporary store and to have an early choice for a prime location in Cavern City when that becomes available. We need the temporary location just to have a place to store all the merchandise that is aboard this ship and that will be aboard all future ships.” Once the store is open I will stay on as the manager. The only other Super Store employees that came with me on this ship are two retail managers. Additional Company employees will arrive on future flights. I would also like to tell your viewers that Super Stores is hiring. I know there are not many people

on Mars looking for work but anyone who is nearing completion of their commitment and wants to stay on the planet could do a lot worse than to figure Super Stores into their future plans.”

“Within six to eight weeks we expect to have the temporary store open for business. Before you even ask the answer is yes, Super Store is one of the principals in Mars Colony, Inc. and before you ask the answer is No we do not expect to make a profit from this store for many years, if ever. Just like Burger Boy's we are here for the publicity and the good news for you folks our prices will not exceed the highest price that we sell a given item for on Earth, plus, of course an additional freight surcharge.”

“We are aware of the situation on Mars, that you have very few people, you are making lots of money and you have no place to spend it. We are also aware that your household's are lacking almost everything we sell.”

Rusty interviewed his guest and the two employees of Super Store for a couple minutes then announced

“We have some more news that we just learned today. The U.S. Government has just christened the new space ship Mars Runner. It is as large as Mars Supply One and Mars Supply Two combined. It will cut travel time between Earth and Mars by as much as 65%. It will start arriving here from three to five times a year, with the first arrival scheduled for Late December of this year. The two existing Mars Supply Ships have been sold to Mars Colony Inc. and will be strictly commercial vessels from now on. We have just been supplied with two new Shuttle aircraft bringing our fleet to five planes. We will need that size fleet to unload Mars Runner when it gets here in December. The next arrival of a Mars Supply ship will get in here around the middle of September. So if you need to order anything from Earth do it now if you want it in September, you still have a few days to get a rush order in.”

The Mars supply ships followed a policy of loading all priority items first then loading the rest of the available space on the ship with wood. On Mars there was always a critical shortage of wood of all kinds.

May 23, 2108: Tim visited the farm. The first crops had just been harvested. The grow lights were all hung so that they could be raised or lowered as needed for various crops. The four farmers were busy but Abner took a few minutes to talk to Tim. There is one more thing I need Tim, Abner said, “There is this a construction worker who we have been reluctant to release because he has been of so much help to us, he still is, he cares for the animals and takes that burden off of us so we can manage the crops. This is the man, Darwin Stead, what are the chances of having Darwin pertinently assigned to the farm?” Tim approved the reassignment on the spot. Then Abner continued, “We will also need a couple more bedrooms and another bathroom added to the house do Darwin can marry his finance, Helen, and remain near the animals in his care.” “Sure,” Tim added, you can use the people now assigned or Just show up at muster in the morning and I will assign

a crew for the room additions.”

As soon as Tim left Darwin and Abner went back into the Lab and lit up a smoke, “See what did I tell you Darwin, it was a piece of cake. I knew you were good people the minute you handed me that little box of seeds.”

May 24, 2108: Tim mentioned to Hal before the morning muster “We will need to install the new generator in a hot area that has running water nearby. I don't know of any other spots like that in The Company cavern or the Government cavern. We have checked Paradise cavern for hot spots. There are some that might work but their location would detract from the beauty of the cavern and the recreation center. Worse case scenario we could locate the new generator right beside the old one but then we would have the problem of running the lines too far to get electricity where we need it.” Carter made his decision, “ We are only using about thirty percent of the power we are now generating. I want to take a look at the next cavern before doing anything. We still have the original diesel generator on standby.”

Tim then told Hal, “The new ship arrival has brought atmosphere alarms and emergency closures that would drop down when mounted in a tunnel if the pressure at one end became lower than at the other end. People could still get through these emergency closures but once the last person was safely through the seal could be made permanent. A little atmosphere would still be lost but the closures would give them time to install air locks while the air was still breathable.” Hal promised that the new safety items would be installed within the week.

The sensor on the atmosphere making apparatus constantly read the atmosphere from various spots and adjusted the output accordingly. The atmosphere in the caverns was not exactly like that of Earth because it was basically just nitrogen and oxygen which meant that it could be made from water and mineral nitrates. In the caverns it seemed to improve the atmosphere to keep it a little higher in oxygen than on Earth. Earth's atmosphere contains a little CO₂ and so does the atmosphere in the caverns because without any CO₂ plants would not grow and photosynthesis would not work and without nitrates plants could not grow. Growing plants require nitrates in the soil to enable them to feed nitrogen into the atmosphere.

May 25, 2108: Tim held the afternoon muster. As promised the Company had sent three hundred more workers on the Mars Supply Two. This brought the total company workforce to over 900. The new men didn't show up because Hal had given a week to get settled in. There were only about 50 workers that did show up but Tim just didn't have enough jobs lined up to keep them all busy. There were no work orders on the board, Tim had checked. All the other crews were already working on jobs they had been assigned.

There was another thousand fruit tree seedlings that needed to be planted so lacking anything better to say Tim told half of the men to take the seedlings over to the new orchard in the Paradise cavern which would

henceforth be referred to as the orchard. "See if Sue or Dan can put you to work. "If Sue and Dan don't have any work for you check with Abner at the farm, if he doesn't need you then you can check in with supply and see if they have anything to keep you busy. The remaining twenty five men he sent to the supply yard to help the supply yard crew. What we need, Tim thought to himself is an administrative assistant to keep track of all these workers and all the projects and jobs that need to be done.

Abner called Tim and told him that he could use twenty five or thirty people the next day at the orchard to plant the new trees but they were not ready to do anything with them yet. Abner said that the people had brought the trees over to the orchard. We are rigging some temporary grow lights at the orchard and preparing top soil, we have plenty of help for that. "Send the planters tomorrow morning, Tim."

May 29, 2108: All three hundred of the new workers showed up for the morning muster along with 150 of the regular crews that had finished the projects they had been working on. Once the workers had assembled Tim asked if any of them had tree planting experience. Twenty people held up their hands, will you people report to the orchard, they have some trees that need to be planted. If anyone here knows of any jobs that need tending to you can go and get to work now. In a day or two we will have some kind of a table of organization working, it won't always be this disorganized. For today the rest of you can go to the supply yard and help get that organized. If any of you see anything constructive that needs to be done then feel free to do it today. You new arrivals can plan on March 30, being your first regular workday. Hal just stood there behind Tim and didn't say a word.

"I need two other volunteers this morning, one person that is exceptionally skilled with computers to fill a systems administrator position that we have open, the other is for a person to do data input. The person that we want for data input should have extensive experience at data base management. If you are interested in either of these positions please see me after this muster. Tomorrow things will be different. After the majority of the workers had all departed Tim told the tree planters to elect a leader then go to the farm manager at the orchard and tell him that you are there to plant trees. Tim felt a little embarrassed that this mornings muster had been so disorganized.

Once the tree planters left to go to work nine people remained. Tim turned his attention toward them. "I assume you nine are the ones interested in the computer jobs." They all nodded their heads in assent. "Lets go over to the dining room and get a cup," Tim said as he turned and headed for the mess hall. All nine traipsed along behind. Tim walked in, filled his cup and seated himself at a long table for ten. He appeared to have his attention focused elsewhere but was surreptitiously keeping an eye on the body language of his five volunteers. One by one the volunteers poured a cup of coffee and took a seat at the table. Tim started "I would like to have you folks decide between

yourselves who should have these two positions. I can tell you that we have had the same systems administrator for the last ten years. She finished her contract with the Government and is departing on the Mars Supply Two to return to Earth. She will have about three days to break in her replacement. The Government abolished her position so the Company authorized me to fill it with a Company employee. *

“The data base management and data input job is a new position. The person selected should have enough experience to establish a data base of the twelve hundred people that now work for the Government and for the Company. It should be arranged so that if I want twelve plumbers you can print out a list of all plumbers with a thumbnail on each of them so I can just call the ones I want that I think are the best qualified for the job I have in mind. If Carter, the Company Manager wants to know the cubic footage of the new Paradise cavern you can provide him with that information right away. In short I would like all of the information on this facility and the personnel that are employed here at our fingertips. How you handle the selections are up to you. You will just have to talk it out and decide among yourselves who among you could best handle these jobs. I will be back in an hour or so to see how you are making out. If you make your selections before I get back call me on your cell phone.”

With that Tim got up and left the room. Before he went out the door he looked back, they were all just sitting there with a dumbfounded look on their faces. They had never heard of a job selection process that worked this way.

When he was out the door he called Hilda on her phone. “Hilda, I need a favor, I left nine people sitting near your desk in the back of the dining room. I told them to Tim described the situation. “ Would you go sit at your desk for a few minutes and work on some paper work and just listen in on them? If you can spare Carla invite her to your desk also. You two can ostensibly be discussing menu's or something.” “Sure, Tim, I am going to enjoy this, I have never heard of anything like it in my life, I am already eaten up with curiosity to see how it turns out. “

Finally one of the women in the group said, “Well I suppose the first order of business is to decide who is here for which job. Why don't those of you interested in becoming system administrator move over to the next table.” With that three men and one woman got up and moved to the next table. Two of them refilled their coffee cups before sitting down. Of the remaining five people four were women and one was a man. The woman who had instigated the move commenced.

“My name 'Doris Rimbot,' I have a BA in business management from Carver college, my minor was in computer science. I am married, my husbands name is Ralph, he also works on the construction crew.” She said he was dead set on this job because of the money and he just coerced her into coming along. I don't know anything about construction but I have worked with data base management systems for the last five years. I would very much like to get out of laying cement blocks and digging in the mud.” At that point the man in

the group said lots of luck lady, he then got up and left the table. The other four women just sat there. One of them started to say something then thought better of it, got up wished the others luck, and left. None of the other three wanted the job as badly as Doris did and apparently none of them considered themselves as well qualified. "I guess you get the job, Doris," one of them said. Another said, "I would love to have this job but I am no where near as qualified as you are Doris so I am withdrawing," "Me too" said the last one. Doris pressed the blue button on her phone and said "CALL Tim Erkin." she got a busy signal so she poured herself another cup of coffee.

The situation was almost the same at the other table. A wimpy little prematurely balding man named "Surge Yugolov" turned out to be so much better qualified than the others at computer technology that the other three capitulated in a matter of minutes. Surge pushed the blue button on his phone but before he could say anything Tim came through the door.

"Congratulations to you two, Surge and Doris, I am pleased to have you aboard. Please meet me at the Government Headquarters Office 1400. I will show you around and introduce you to the rest of the staff. Neither Doris nor Surge ever found out how Tim had gotten their names. It was pretty simple, as soon as Carla knew the names she left Hilda's desk returned to the kitchen and called Tim. She was the one talking to Tim when Doris got here busy signal and invitation to leave voice mail.

Tim then went to his office, but before he could get in the door Carter and Paul collared him and invited him to lunch at the Government dining room. During lunch Tim briefed them and they briefed him on all the latest developments on the facility.

Tim brought them up to date on construction, the tunnelers should celebrate another breakthrough some time this week. And we will have a new cavern to tame.

"I need to group the nine hundred people that we now have into work crews so I have hired a person to set up and manage a data base for us. While I was at it I found the systems administrator that you said you need, Paul. I didn't think you would object to me making the selection since the Government is no longer funding the position. If we ever become critically short of construction workers I can always pull him but until that time comes he is yours. Both of these people will be at headquarters at 1400 and I will introduce them around. Maybe you can ask Alice to show Serge the ropes before she departs next week. This new girl, Doris is pretty sharp so hopefully by next week she will have enough of the data base set up to organize the construction crews."

Until we breakthrough and tame Utopia we are going to have a lot of surplus labor on our hands so if either of you can think of a project that will keep people occupied let me know. There were seven hundred or more people showed up this morning for assignments so after putting half of them to work I just told the rest to go over and get the supply yard squared away. That has

been my day so far.”

“Paul and Carter just laughed.” Paul said we discussed establishing a legal system with a police department, courts, judges, laws and everything. Then we discussed the mess we have at City Hall and what we need to do to straighten that out. Then we decided we better notify the Government to send up several surveying crews. We also discussed the need to have an elected Government to handle local issues, you know like a city counsel or something. Nothing is firm yet on any of that but we'll keep you posted.

After lunch Tim had a chance encounter with the head of the Government Scientists. “I have a question for you George, It's about Ivy, Abner says it will grow anywhere there is an ordinary lit cavern and it doesn't need special grow lights.” “If it does? Tim, I don't see how it would enrich our atmosphere because without the grow lights it could not photosynthesize.” “But,” answered Tim, “if it didn't photosynthesize, how could grow?” “Good question, is Abner growing ivy now that is not exposed to grow lights?” “Yes, I have seen them, they were just little half Inch shoots but they were bright green.” “I'll check into it and let you know.”

At 1400 Tim met with the two new computer people at headquarters. He introduced Doris and Serge to the rest of the staff. Tim then assigned Doris to a computer station and showed her how to access the data base manager program and the available data that was now scattered in various places on the drive. “Hopefully I will have enough of a data base put together in the next few days that you can select work crews based on any criteria you like.” “Hal Johnson, my assistant will be using the data more than I will, he is the one that will be assigning the crews. I will be more interested on the projects that we are working on and how they are progressing. That proved to be all the instruction that Doris ever required. After about a week Doris was able to give anyone in management a list of anything they wanted in just a couple minutes. Everything began running more smoothly.

With the size of Paradise cavern plus the Government cavern and the Company cavern Tim found that he was spending most of his time moving from one place to another. Tim thought what I need is a golf cart to get around in, I am going to have to mention that to Carter next time I see him. Tim made a note to ask Carter about Golf carts.

Tim next checked on the of the tunneling crew. “We are making much better progress now that we are not working in those darned Mars Suits” the foreman told Tim. I think we are about three or four days out from breakthrough. The tunneling crews changed drilling techniques with each change in soil conditions. When they came to solid rock they would blast or use jack hammers, when they were in loose soil they just used old fashioned picks and shovels, when they were in tight packed soil they used power drills to break it up. They just whatever they needed as conditions changed. If they were in loose soil then they had to reinforce the tunnel sides and top as they went along.

All the loose soil they dug out was scooped up with a front end loader and hauled to the farm or the orchard. The rocky soil and rocks would be used as fill when they went to level the cavern floors.

Tim constantly had a crew making cement blocks on the surface. He found that cement block shortages were holding up other construction so he started using three crews on the surface making cement blocks when the weather permitted. Two more crews were constantly leveling cavern floors and placing cement blocks to make floors and roadways. They would only be putting a roadway across the Paradise cavern and walking trails so as to not ruin the aesthetic quality of the cavern.

As Tim was leaving Paradise cavern he ran into Carter. "What would you think of getting a few golf carts for the managers to get around in?" "I am way ahead of you on that one, Tim, since we have so much distance to cover now I discussed it with Paul a couple weeks ago. He sent out a request for one hundred indoor carts and thirty surface carts with wide wheels that wouldn't sink into Mars sand. When I get their answer I will let you know."

May 27, 2108: George was in The Company cavern so he decided to stop by the farm and have a look at the Ivy. Abner showed him the small plants that now had leaves and were about three inches tall. "I don't understand it," said George, "In theory this can't be." Abner answered, "That reminds me of the story about the old man that took his grandson to the Zoo, the two of them stood in front of the giraffe cage for several minutes watching the animals, then finally the old man yanked on his grandson's arm and lead him away, Come on, son there ain't no such animal. Just maybe, George there is such an animal." "In that case Abner, go ahead and spread your Ivy like Johnny apple seed, The stuff won't create any problems until you try to get rid of it. There are colleges in New England that have been trying to kill the stuff off for two hundred fifty years but about two hundred years ago they found the solution to their problem." "What was that?" ask Abner. "Oh they just started calling their little group of colleges 'THE IVY LEAGUE'".

May 30, 2108 : That evening of was Walter and Thelma's going away party. It was celebrated much as they had celebrated New years Eve. Thelma and Walter each made a speech then Paul and Carter each made a speech telling them how much they would be missed and Rusty was there with a cameraman to record the event for posterity and for use on the local news the following evening.

CHAPTER – Other Nations want in

June 1, 2008

Meanwhile back on Earth things were happening that could effect the Mars Project. "Mr. President, the Chinese Ambassador." "Welcome, Mr.

Ambassador, let's have a seat on the couch over here and you can tell me to what I owe the honor of your visit. Could I offer you something to drink?" "Oh, cut the crap, Chet, you know why I am here, We want in on the Mars program. We want our own colony with our own people running it." "So, Ambassador Jing, why are you telling me this?" We make no claim on the planet Mars, only to the parts of Mars that we have opened up, and developed.

You are free to develop your own program any way you want so long as you don't violate any of our territorial claims. As you know we claim any cavern that we have pressurized and populated and any cavern, any part of which is within two hundred Earth miles of any cavern we have pressurized and populated." "We are aware of that Chet but what we are seeking is your help in developing our program. We want you to help us in all fields of development to establish a Chinese presence on the planet that does not violate any of your territorial claims." "We would be happy to oblige you Jing but we have one stipulation that you must agree to in order to gain our full support." "What is that Chet?" "That we have the right to approve any people that you want to send to Mars either on our space craft now or your own space craft any time in the future. You know very well that anyone you send must be of good character and be able to pass a fluency test in the English Language and that you acknowledge that the English language is the official language of Mars and that all communications on Mars, to Mars or from Mars be in English. You know how many difficulties that this planet has had because of language differences, we just want to prevent that happening on Mars. If you agree to that then we will share all that we know about Mars with you, We will train your people for a price, we will transport your people, for a price and will assist you in any other way that we can in establishing your colony on the planet. We will also allow your people to visit our facilities at any time." "That is where the rub comes in Chet, we are Chinese and proud of it. Sure I am fluent in English but I doubt that I could pass your fluency examination. The kinds of people that have the skills for this kind of endeavor certainly could not pass. Also I am not so sure that my Government would go along with English being the official language of Mars." Then Mr. Ambassador I suggest that you start from scratch and develop your own program on your own terms. I am sorry Jing but I saw you without an appointment because I was given to understand that you had only a couple of quick questions and now I need to see my regularly scheduled guest, the ambassador from Japan."

President Harford did the same song and dance that he had just done with the Chinese Ambassador. The Japanese Ambassador also left in a huff. The President then buzzed his secretary. Get the press secretary in here right away. "Flint I have a job for you.. Get a recording of my last two conversations from my secretary, listen to them then make up a position paper expressing those tenants and see to it that all of the nations on Earth that might be in a position to make a similar request get a copy. Also make sure that the Speaker and the Sennett Majority leader each get a copy along with a note that I would like to be able to sign this position into legislation. You can have the legislation

drafted for them it will make the job easier. I am sure that we have the backing of both sides of the Isle on this one so it will be good for relations. Tell them they can attach it to the next bill they pass unless think it is a bill that I might want to veto.”

Two weeks passed and so did the bill. Then the President received a visit from four different ambassadors at one time. They represented respectively The UK, Canada, Australia and New Zealand.

“Mr. President I am expressing the sentiments of all four of us and our countries when I say that we very much approve of your position that English only should be spoken on Mars and that any candidate that is sent should be subject to your approval.” “Our four nations have met on this matter and we would like to join the Mars program. Here is what we would like to offer. We are willing to reimburse the United States for 40% of everything that you have already spent on the Mars program over the last twelve years. We would like to continue to reimburse the United States 40% of everything that you spend in future years, but we would like to provide candidates for your approval of all future colonists that are sent to Mars by either the United States Government or sent by Mars Colony, Inc. until the population of Mars is 40% from our four countries then we would like for 40% of all future colonists to be chosen by you from candidates that we provide to you. When you breakthrough into Utopia we would like for 40,000 of the first 100,000 people to reside in Utopia to be selected from candidates that we provide to you. Beyond that we would all caverns developed in future years be allocated as follows, any cavern with a floor space of more than one hundred square miles be jointly populated. And that all smaller caverns be allocated so that Australia gets ten % of them, New Zealand gets ten percent, Canada gets ten percent and that the UK gets ten percent as our own domains. The United States gets sixty percent.”

“That is very interesting but you are aware that I personally do not have the authority to accept or decline your offer. What I suggest is that you gentlemen sit down with our representatives who will be chosen from the administration as well as from the House and the Senate and hammer out a deal that we can all live with. There is one thing that I can tell you right now and it is unofficial. There are certain guidelines that we use to select our candidates, these rules fly in the face of some of our own civil rights legislation but we have been getting away with it so far.

1. We do not take race into account.

2. We select equal numbers of men and women.

3. And here it gets a little sticky, we do not accept any candidate with homosexual tendencies, we feel it would not be accepted by our people who presently reside on Mars.

4. This one is really sticky we have not as yet selected a candidate outside of the following, Christians of any denomination, Jews, Agnostics and Atheists. We just don't want any religious conflicts. So far we have not

selected any professed Atheists, but we do have a few Agnostics. None of the people that we have selected have any real strong religious feelings at all. Next, we have been requested by the colony to provide them with Catholic and Protestant Chaplains and at least one Rabbi. These people and their necessary equipment have already been selected and will depart on the next flight. Beyond that we would accept any chaplain candidates that you care to nominate but those would be sent at your expense.

5. Frankly I don't think congress is going to go for your deal about separate domains. Here is what I think you will end up with. After you reimburse the United States for 40% of what we have spent so far you will be allowed to send 50% of all future candidates until you reach parity then you will be allowed 40%. You must also be aware that we have a small private sector emerging on Mars. These people travel as paid passengers on our ships. We presently charge five hundred thousand dollars for the trip from Earth to Mars and one hundred thousand dollars for a return flight or \$550,000.00 for a round trip ticket. We have just launched a new space ship we christened Mars Runner. It is as large as our two other ships combined. Mars Runner belongs entirely to the United States. We have sold our interest in the other two ships Mars Supply One and Mars Supply Two to Mars Colony, Inc. but the United States has retained control of who The Company hauls up to Mars and what cargo they carry. You will have to negotiate for what cargo rights, business rights, property ownership rights you will be entitled to on Mars. All real estate other than what we call the Government cavern is owned by the company. They will be free to develop it any way they please. They have agreed that the United States share in the proceeds of any sales or leases of real estate. Only residents of Mars are eligible to own real estate on Mars but corporations in good standing are allowed to lease real estate.

6. So far we have no laws on Mars but the community is working on a criminal and civil code at this time. Mars presently has the status of a U.S. Protectorate. Common laws that apply to all Protectorates apply to Mars.

7. We have no civil or criminal courts on Mars but they are working on that. We have not surveyed any real estate on Mars.

8. We have never had a crime committed on Mars and it is a good thing because we have no police on Mars.

9. So far we have a private ownership bank chartered by two citizens of Mars who were United States Civil Service Employees who finished their employment contracts with the government. They have been in operation for several months and are affiliated with City Bank in the United States. We would not want to see any other banks on Mars until the population exceeds 30,000.

10. Burger Boy's has opened a restaurant outlet on Mars and Super Store should be open within a matter of Days with a temporary store pending the development of Utopia where they have a franchise to open one store for every 40,000 population. All other business fields are wide open.

These things also you need to take into consideration when you are negotiating with our people. Don't be fooled by congress, Mars Colony, Inc. has the hammer and they are the ones that will ultimately call the shots.

You would probably save yourselves a lot of red tape if you negotiated directly with Mars Colony, Inc. and eliminated the middleman. Congress will probably legislate in favor of any deal you strike on future development, land use, business, etc. Congress will be more interested in some of the social issues we discussed.”

“Mr. President, do you think we could”. “Hold it right there, this is not a negotiation, I just gave you some pointers, save your negotiating for the big shots. Sorry but I have another appointment waiting. I wish you all the best of luck.”

They negotiated for almost a year and ended up with a deal that closely resembled the deal that the President had outlined when they talked to him in his office.

They also acknowledged that there was a distinct possibility that if the Mars colony applied for statehood at some future date, when they were ready the application would probably be favorably received and that if that happened all the residents of Mars would either be admitted as Citizens of the United States or would be granted Green Card, resident worker status.

They didn't care much for that clause and it had never occurred to them that what the United States had planned for Mars was the eventual doubling of the size of the Continental United States and adding as many as three hundred million new citizens. Needless to say the UK consortium eventually lost interest in the deal.

“Why give those blokes our best and brightest, the Prime Minister Said.”

Mars Colony, Inc. did start placing recruitment ads on the internet soliciting applicants from those four countries.

CHAPTER – Big Lake and the Utility Cavern

June 6, 2108 : The Tunnel Crew finally broke through to the second new cavern. It was huge. It was not as spectacular as Paradise but it was larger than all their previous caverns combined. Almost thirty square miles. It was two caverns actually. left as they broke through then a narrow opening,

The tunneling crew had only to don their Mars suits for the last four hours before breakthrough. The cavern had one nice feature, the floor was almost flat. They could tell from the light filtering in that it as well was a beautiful cavern The walls almost had a glow to them, they kind of glistened when a light was shined on them. A stream, almost a river entered at one side

then pooled into a lake that was quite large near the center of the larger part of the cavern, probably about five square miles before turning once again into a stream and flowing out the other side of the cavern. This cavern was slightly higher in elevation at floor level than Paradise had been.

Tim and Carter were both on hand for the breakthrough, accompanied by a lighting crew who installed temporary lights in both the large and the small part of the cavern.

The large part had a very high ceiling and very few fissures to the surface so they knew they were under a mountain. Had the ceiling been this high on flat land it would only have been a pit. The scientists speculated that this large cavern had been formed by a large meteor striking the surface maybe a billion years in the past. Their guess was that the meteor had also formed the lake that was very deep and filled with crystal blue water. Most of the scientists from the Government cavern were pouring into the cavern taking soil samples and water samples for testing. It was obvious that this cavern had been formed differently than the others they had come across. Tim and Carter agreed that this would be the most comfortable cavern they had found and this is where they should probably be working out of once they had tamed it.

Tim and Carter briefly discussed running an enclosed tunnel through this monster cavern but withheld making any decision until they knew more.

They didn't notice, since they were wearing Mars suits but the temperature had risen to 75 degrees in the small side and 72 in the large side. The scientists discovered that right away though. "My guess is that you are going to find beautiful hot spots in the small side." "Yeah, we have enough equipment to tame this cavern. There is water, maybe we should tame it, we will know more in a couple days after we have had a chance explore the small side. We have been so enthralled with the big side that we have paid little attention to the small side."

Carter and Paul sent a joint report to Earth telling them what they had found. They were developing quite a list of things they needed to develop these new caverns. It would take several days just to explore the new caverns.

The list grew longer and now included a request for more bureaucrats. The shortage of clerical help is becoming critical. We need more clerks everywhere on the facility and once we get our legal system in place we will need Judges, and all the other people that are needed to run the court system. We will need at least one prosecuting attorney and one public defender and a lot more more clerks. In the public records department we have only one part time clerk now, we need a full time staff. We need at least three police officers, we need a dispatcher, We need everything that we would have to have to hold an election. Maybe on the next ship we could skip the construction workers and send the people we need to convert this work camp into a small city.

They did find several hot spots in the newly opened small side of the new cavern. There was a warm stream running across the cavern. It was obvious

that this would be the place to house their utilities so Tim put crews to work installing the new generator, and the atmosphere making equipment. The Government atmosphere control people had activated one of the backup atmosphere control units when they opened Paradise. They would now need to activate the remaining two. There were six more units scheduled for delivery in September. Tim requested that the two remaining back up atmosphere systems be installed in the Utility cavern so they could go ahead and pressurize the Big Lake cavern.

June 15, 2108: Big Lake cavern was pressurized.

CHAPTER – Super Store opens for Business

Super Store opened on the first Sunday of June, 2108. There were six hundred people in line when they opened their doors. They had put their shelves up and stocked the store with all the select merchandise that they had been able to transport on the one hundred pallets they had been allowed on the ship.

They opened the doors at 0900 all of the merchandise, every piece of it, was in the hands of customers by 0930. People had just grabbed anything they could get their hands on, it didn't matter whether it was something they could use or not. With only three registers open it took until 1300 to get everyone checked out. At that point there was no reason to remain open so they hung a sign on the door and reconciled themselves to waiting for the next ship which would be in August. All three Super Store employees went to work for the bank on a temporary basis until August.

The following Sunday there was another giant swap meet in the business district which had now become known as the square. Most of the merchandise that had been purchased at Super Store was available for resale to the people that actually needed the items for a slightly higher price of usually twice what Super Store had sold it for. The swap meet also sold out in a few hours and had to shut down.

Archy had wondered why there were so few people show up for church. The church was open and operating now in the square with cement block benches to accommodate one hundred worshippers. Archy put up a sign in front of the church announcing an evening service to begin at 1900 hours. That service was packed. Archy had successfully solicited twenty residents to form a choir and chosen a choir director from among them. That evening the church was packed and everyone enjoyed the choir and the country and western band that accompanied them. Archy's leaning in the church was heavily toward lots of hand clapping and gospel music. Everyone seemed to have a great time. They particularly enjoyed Archy's preaching that was heavy on the shouting to the lord and bible slapping and Hell, Fire and Brimstone rhetoric.

The church had to be doubled in size to accommodate the congregation. Archy only wished that he was not obligated to The Company for the next ten years so he could devote full time to his work as pastor.

June 20, 2108: Tim and Carter discussed this with Paul who agreed that Archy was such a positive influence on the community that Carter and Paul requested that he be reassigned by The Company as the pastor of the church as his full time work. After all they needed a full time pastor to conduct weddings, baptisms, funerals and the many other duties that a pastor performed in the community. Paul had already found out that the protestant pastor that The Company was sending to Mars as Chaplain was an Episcopal priest so there would be very little conflict between Archy and the new Protestant Chaplain. Carter took it on himself and contacted the The Southern Baptist Theological Seminary in Louisville, Kentucky who when they heard about Archy's ministry and viewed a video of one of his services on Mars held a special ordination in absentia ceremony and not only ordained Archy but gave him an honorary Doctor of Divinity degree. Now Archibald Shrimp would a full time practicing minister with his own church and congregation. On Mars he was called the Chaplain.

While this had all been happening the small side of the new cavern had been sealed and pressurized the large end of the cavern would just have to wait for more equipment to arrive from Earth. Two wonderful discoveries were made when the scientists could get into the cavern and examine it closely. There was adequate geothermal energy in close proximity to provide power to several large generators, maybe enough to power all of Utopia.

June 30, 2108: The second discovery was a vein of gold larger than any vein that had ever been discovered on Earth, anywhere.

"The company is going to be very happy to hear about this discovery Carter." "Now maybe we will have something to send back to Earth instead of everything coming this way." "Better see if we have anyone with hard rock mining experience and get them extracting that gold ore right away. I would like to have as much as possible on hand to ship back when the next supply chip gets here in August.

Tim went to Doris and had her scan the data base of employees and picked out fifteen candidates who had claimed to have the skills that he was looking for. He called each of them on his cell and ask them to meet him in the small cavern that had just been tamed in one hour. Tim was the first one there and looked around while he waited for the others. Shortly all fifteen had arrived and he said "I would like to show you gentlemen something and then I would like you to tell me what you think." He lead them to the wall and pointed out the vein. "Wow that is really something." Tim just stood by and listened to their ensuing conversation. It didn't take long for Tim to choose his foreman. One of the men, Harold Dixon seemed to know a lot more than any of the others. The other men were looking to him for answers. He had a relaxed posture and attitude, was very knowledgeable and communicated his thoughts easily to the

others. "You men have just been reassigned to the mine crew. Please advise your present crew chief's of the change. You can get together and decide what all you will need to get started extracting that gold. Harold would you step over here there is something I would like to ask you?" "Sure" Tim and Harold walked about 50 feet away from the other men and Tim said "you seem to know quite a bit about this mining business Harold just how much experience have you had?" "I have been a hard rock miner all my life and my father before me spent his life mining, my grandfather was a prospector. My family is from rural Nevada. The mines are pretty well played out there so when this job came my wife and I jumped at it." "What is your educational background Harold?" "I have a BA in Engineering from University of Nevada, Reno and a Masters in Mine Engineering from Colorado School of Mines, in Golden, Colorado." "I'm impressed, you will be in charge of setting up this mine and supervising this crew.

Make sure that the things these guys have put on the list they are preparing are legitimate and then see if you can find enough of the things you need in the supply yard to get started. There will be a ship arriving here in August but it is too late to get anything on that ship. We should be getting two ships in December and what you need besides what we already have here will be on that ship." If you can find enough to get started in the yard your crew can start in the morning. You will probably be seeing a lot of me around here for a while because among my other chores I am a drilling engineer and we will be installing another generator about a mile over there." Tim pointed toward the hot spots. "Give me a call this evening and let me know if you want all the men that are here or if you need more that are unskilled. These men here are the only ones that claim to have any hard rock mine experience. I should be able to find you some coal miners though if and when you need more men."

June 30, 2108: The next morning Tim allowed his assistant to hold the muster while Tim got his drilling crew together and began to pillage the supply yard. They found better drilling equipment than they had used on their first hole in The Company cavern. He then inspected the new generator and found it was almost twice the output of their present generator. He told the men to gather all the equipment that they needed and meet him at the hot spot when the equipment was all in place. These were the men that Tim had worked with on the previous hole and they all pretty much knew what they were doing. They didn't need much direct supervision and Tim already knew which of them would be best qualified to be in charge of the project when he wasn't there. It took them all day to find and move the equipment so they didn't need to call Tim any more that day.

Tim then looked up the air quality control supervisor who was one of the Government scientists. "Where do we stand on getting the new atmosphere equipment installed at the Utility cavern?" Tim ask. "So far so good, I was relieved to find that we had everything that we need and it is being moved to the Utility cavern now." The small new cavern that had just been opened had been dubbed, the Utility cavern because of the generator and atmosphere equipment

being installed there. "We should have the new equipment running in a week or so. Then there will be no question that we will have plenty of atmosphere so we can open the big half of that cavern." "Crews were already working on the surface sealing the fissures on the big half so it looked like they could open it up within the next week.

July 1, 2108: tunneling was coming along great on the tunnel to the third new cavern. It would be a 580 footer and the crews were already in ten to twelve feet and another crew was already installing the air lock. Every evening the spa in the paradise cavern was packed with people enjoying the hot water. Some were even swimming in the warm river. The park had turned out to be very popular with the population of Mars.

Tim could hardly wait to get Big Lake Cavern opened, and the lake stocked with fish. Tim had no idea how they would manage to build boats or rafts to use on the lake but he was sure someone would come up with something. Tim made a note to himself to find out about getting some electric outboard motors, they could always find some Styrofoam or empty drums or something that would float.

The tunnel enlarging crews had started work on enlarging the tunnel from the Paradise cavern to the Utility cavern.

Tim, Carla, Juan and Lupe once again started playing shuffleboard in the evenings. They had no trouble at all finding an open court.

July 4, 2108: Tim and Carla attended the Saturday night dance and found a table. They danced a couple times while they sipped a cup of tea. Then Carla said she would like some air so they stepped out. No one had yet figured out how to hold fireworks on Mars, and they didn't have any anyway so it didn't seem much like the 4th of July.

Tim remembered something that he wanted to get from home so he went around the mess hall to go and retrieve it. He was shocked to see about thirty people sitting around in folding chairs pulled up to folding tables all smoking clay pipes. They could hear the music just fine from there and some of them had laid down their pipes to go and dance. Tim spotted one of the men he new in the crowd and went over and joined him. The man casually acknowledged Tim then passed him his lit clay pipe. There was no doubt at all what the pipe contained. Tim respectfully declined but gave the man a big smile. Nothing had to be said.

On Sunday, after church Tim called Paul and Carter to request a quick meeting. He related to them what he had observed behind the dining room on Saturday evening. "We already know all about it Tim, and we have figured out how to handle it." "How is that," Tim ask. "By doing nothing," Carter responded. If I caught a member of management smoking in public I would ask him not to do that any more, but as long as we don't have a problem during the work week, I see no harm in it. After all pot is now completely legal in twelve states. So far it has not occurred to the Government or The Company to address the

issue. We have had a chat with Abner and Darwin over at the farm and they assure me they are giving the stuff away to anyone who comes by and asks for it. Sometimes they say that a person will slip them some small amount of money for their trouble but they never ask for anything in return. Since alcohol is not available this pot is the only thing people have to help them relax and have a good time at the Saturday night dance and other such gatherings. If anyone wants to smoke it in their own home we have no objection to that either.

Paul and I both agree that everyone would be appreciative if we never brought the issue up. On the other hand if you ever caught anyone smoking on the job you should probably advise them that what they are doing is not allowed and if they persist they could ruin a good thing for everybody." "That is all I wanted to know, and I have no objection to the non policy," said Tim. "I will see to it that Rusty doesn't do a story about it on TV and that everybody gets the word they should not smoke in public when there is a ship in port. I think those should be reasonable restraints, after all we don't want word of this non policy getting back to Earth." Tim added.

July 10, 2108: The two gentlemen who had volunteered to produce alcohol had harvested their first crop of corn and finished making their first batch of booze. They only produced about twenty gallons and had already consumed quite a bit of that themselves. No one had planted more corn. Abner had corn growing at the farm but it had not been earmarked for making booze. It appeared that our booze project had failed. Tim had the two men take the remaining booze over to the farm where Abner had agreed to store it until next New years Eve when everyone would get one drink as far as it went.

July 1, 2108: Two of the Government workers who had remained on Mars as private citizens had been racking their brain to figure out what kind of business they wanted to go into. They finally hit on the idea of starting a winery and brewery. Ironically their names were Austin Viner and Byron Suds. They had ordered the plants and grow lights and other equipment that they needed to produce grapes, hops, barley and yeast and were working at Burger Boy's until their stuff came in in December. It had cost them almost a million dollars but they were sure they had made a good investment.

July 6, 2108: Tim went to see Abner that morning to tell him that there was now plenty of room for his orchards. Tim had staked off 40 acres of land in Big Lake cavern. Tim asked Abner to accompany him to Big Lake. The two of them walked the area reserved for the Orchards. "Great said Abner now all I will need is topsoil and grow lights to cover 40 acres of land." Abner had been mixing local nitrates with manure from the farm and Martian soil for some time. He had quite a pile of it. "You see this Tim," Abner said when they returned to the farm. "If I mix this soil with the contents of my compost pile, then plant each tree in a 3X3X3 hole filled with this mixture I should have a good start at growing our orchard. I can dig the holes now and fill as many of them as possible with this soil I will start another soil conversion pile at the Orchard. Once you get the grow lights in I will be able to start transplanting these little

trees.

August 12, 2108: Mars Supply One docked. They had brought only one hundred new construction workers but they had brought two hundred new civil service employees. Mars now had the staff for the public services that they needed. They got 150 new clerical people, one judge, two attorneys, a Public Records Librarian, and even three police officers. One of the clericals was an election specialist and would work in that capacity full time as needed if and when there were to be an election. In the meantime she was assigned to computer input work. One of the new clerical workers was assigned as Tim's secretary. Tim had been taking up too much of Doris time lately with his projects that had nothing to do with her data base work. Tim had accumulated a ton of work for that he had been putting off.

Among the cargo items that arrived were 1,000 new grow lights. Tim already knew they would be on this flight because he had told The Company that the trees they had sent would be of no value without them so they had agreed to put them on the next ship out.

The ship had also brought ten thousand board foot of utility grade ply wood in various thicknesses. There were the usual food supplies and among other things, lots of odds and ends they desperately needed.

Aside from personnel they got the 125 golf carts they had requested. They came all dismantled and crated but assembling them would not be a problem. Everyone was thrilled that they got two hundred thousand fingerling catfish, cutthroat, bluegill, and crappie. Before the ship arrived screens had been installed on the two warm rivers to keep the young fish from swimming off into uncharted regions of Mars. There was a lady ichthyologist that said she had been sent along to care for the fish. She had enough fish food to keep them growing for three months and knew how to process table scraps into fish food. There was the parts necessary to construct a new large geothermal generator, another unit would arrive in December when Mars Runner made it's first arrival. One great thing that came in was five thousand cubic feet of hardwood. It was in various sizes but wood was something they had plenty of uses for. There was cargo for the farm as well, Abner had ordered and now had received twenty million Earth worms. Super Store even received another hundred pallets of merchandise. Tim laughed, now they will be able to open for business for another one day stand.

Tim was wrong, this time around it took Super Store into the second day to sell everything that they had.

Ever since Tim had arrived the new arrival's had all had housing waiting for them. The previous crop of new arrivals and this group had rooms in row houses, They had started using common walls between the units instead of building individual houses as they had done at first. They would build another row of rooms that shared a common wall at the rear of the room. The completed units resembled motels. The buildings were then given a number

followed by a dash and then a letter, as in 354-C. There were 20 units to each building so they would letters up to T.

Because of the irregular work hours the kitchens and dining rooms had started staying open 16 hours per day. They would just transition from breakfast to lunch to dinner and people could eat any time they pleased. The kitchens had started offering more choices of food and serving buffet style rather than just serving everyone that came through the line the same meal. The Government kitchen always offered a different food selection than The Company kitchen. Residents were free to eat in either dining room. For the most part the vegetables were fresh from the garden and both dining halls usually offered a salad bar, and a choice of dressings. More cooks and kitchen help were arriving on each ship so they had plenty of help in the kitchens. In addition to these changes it took standing in line for 20 minutes or more to get a Big Boy and fries.

Paul mostly but Tim and Carter to a degree had dreaded the day that they would have police officers on duty in the community. Now they had a U.S. Marshal and two deputies. Paul summoned them to visit his office. In about ten minutes three young women entered the office. "Are you the police officers?" Carter asked. "Yeah, not what you expected, huh?" "No, not exactly," Tim answered. "Just what do you ladies expect to contribute to this community?" Paul inquired. The older of the three spoke for the three of them. "Why don't we introduce ourselves, I am Deputy United States Marshal Constance Raul, my two associates here are Marlene Dotson and Pamela Justin, they are also Deputy United States Marshals but I am in charge because my pay grade is higher than theirs and I have been with the Marshal Service longer. You gentlemen are?" I am Paul Silverman, the facility director and this is Carter Fredrick, the Mars Colony, Inc. manager and Tim Erkin, the construction superintendent. The titles may be a little misleading but the three of us pretty much run the facility. "Now as I previously asked, Just what do you ladies expect to contribute to this community?"

"We will have a lot to do," Constance replied. "One thing will be to find out why you have never had a reportable crime in the twelve years since the colony was established. Another thing is to be the administrative arm of the court system once that is established. Another would be to investigate any crime that does occur, and believe me, it is inevitable that sooner or later as your population grows you will have some crime. You gentlemen could probably apprehended a suspect but there are occasions when you wouldn't know who to apprehend. I know we are young women but between us we have had over 27 years of training beyond high school, in college and in practicing our professions. Any of us would be qualified to work in a crime lab or work as a crime scene investigator on Earth. If, as you apparently believe, it turns out that we have nothing to do then we could always ask you for permission to take jobs on the young economy that we hear is emerging on Mars. That way we would always still be available if you needed us to do the job we were sent here to do." All three of the men in the room were impressed. "I guess you don't

need any advise from us so just go about your business. Carter put in, "We have constructed a court house of sorts, but like you said we have never had a crime, we have never had a civil action filed either. You will find your offices in the court house along side the one cell jail that we constructed. There is also a bailiffs office, judges chambers and a court room with a jury box and everything. One of our people will be in touch with you to find out if you need anything. The girls left and Tim looked at Carter and Paul and just shrugged.

As it turned out, not only were the three U.S. Marshals all female but so was the judge and the two attorney's. One of the attorney's was the prosecutor and one the public defender. The bailiff, however turned out to be a large black man that appeared capable of putting down any courtroom difficulties.

"This is great," said Paul. "we now have a whole legal system in place but we have no laws to enforce or to charge anyone of violating." They then summoned the judge, Nancy Whalen to the office along with the two attorney's. Paul posed that same question to them. "Oh, but there are laws a plenty. This colony is officially a territory of the United States, and laws have been accumulating on the books that govern U.S. Territories for the last four hundred years, I have over thirty seven books that I brought from the states that are just crammed full of those laws. These two attorney's here each have a copy of all the same books that I have. With email we have access to a lot of other laws that are available from the national law library and from the library of congress.

"Your local assembly, whatever you call it needs to pass what would be called county ordinances on earth. How do you get by without them?" "Simple," said Carter when there is a good reason that people should not do something we just tell them not to do it and they don't do it. It works the same as when you have something you want them to do we just tell them to do it but we always give them a reason. If we don't have a good reason we don't bug them, it works for us."

August 13, 2108: Because of having received advance instructions four large ponds had been dug, cemented and cured. The ponds were adjacent to the warm river across from the farm in The Company cavern. They were ready to receive the paint that Grace, the new fish farmer had brought from Earth. The day after they got the paint the crew that had been assigned to help Grace, set up painted the four ponds. The paint was quick drying and sat up in an hour. The workers scrubbed the new paint then painted over that with a nutritional gel resembling bottom and sides of an established pond. By noon they opened the four trap doors allowing river water to pour into the ponds. Fifty thousand young fish were dumped from the tanks they had lived in on the ship into the ponds. Each breed had their own separate pond. Several hundred fish in each pond floated to the surface. They had died en route to Mars. The dead fish were quickly removed. Some of the young fish began to swim a little but others just laid there, their gills moving as if they were gasping for air. Grace, the fish farmer put a little food into each tank. The catfish food sank to the bottom while the blue gill, trout and crappie food floated on the

surface. Thank you folks so much for all your help but there is nothing more you can do at the moment. You may return to your other duties. One young woman stayed behind when the others left. If it is all the same to Mam I would like to relieve you while you go and take care of your housing needs and put your things away. After that you can go and have lunch and come back when you are all squared away. Just tell me what to do while you are away and I will see to it. "What is your name hon," Grace asked. "I am Helen, Mam." "I just think I may take you up on that offer Helen." Grace said, "At this point there is really nothing to do, just keep an eye on the fish and scoop away any that die and float to the top. I will be back in a couple hours."

Because the bureaucracy was in such a turmoil because of all the new arrivals it took Grace closer to four hours before she found her house, found her luggage and had lunch. When she returned Helen was still there, the net in her hand and she was carefully scooping away the young fish that had expired.

The worms that Abner had received at the farm were introduced into the crops and the orchards and to his compost piles. A million or so Earth worms were given to Grace because she could use them in her own compost operation that was part of her making fish food out of garbage.

As the days passed Grace had little difficulty in caring for her fish and still had time to go to her meals and take care of her personal matters and check on the fish as often as they needed checking on. Every afternoon Helen would drop by after work and just look at the fish. Sometimes Grace would return to check on the fish and Helen would be there. Sometimes Helen would drop by while Grace was working with the fish. Would you tell me about these catfish, Grace?" Helen ask one evening. "Sure Helen, these fish grow fast, they were barely hatched when the ship had left Earth but already some of these guys are six inches long. A catfish in ideal warm water conditions can grow to over two pounds in one year. For the cost of production catfish easily out perform all other fish. Crappie (pronounced Croppy) are prolific and grow to about two pounds in 18 months or so. They are good eating with lots of meat but you have a lot of bones to contend with. A lot of pet food manufacturers use crappy in their products but they grind them up so the bones won't harm the pets. Trout and blue gill are fun fish, they are fun to catch and they are fun to watch, but catfish that is where the meat is. Of course blue gill are a favorite of people who like to fillet small fish and fry them crispy in a pan. Trout really isn't one fish but a family of fish, we have several varieties in this pond and they are also good pan fish and the larger varieties are good baked. There is a lot more but if you are curious why don't you look them up on the Internet and learn all about them. The fish that we chose to try first on Mars were chosen because they are hearty fish that we thought might make the journey to Mars and still be alive and they are fish that we thought might be most likely to adapt best to the environment here. If I can find the right location I am going to try and create a salt water lake and have them send up some salt water fish to try here." "Within eight or nine months we should be eating fish regularly and fishing should be a popular sport on Mars within a year." "I am just taken with these fish Grace I

would love to work with them if the time ever comes that you need an assistant please consider me for the job. My boyfriend, Darwin got a job on the farm over there caring for the animals. Darwin and I are planning on getting married soon and it would be great if he cared for animals and I cared for fish.”

August 22, 2108: Grace had inspected Big Lake and had inspected the warm river that flowed out of the spa in Paradise and would soon be moving a couple thousand trout to Big Lake and a Thousand or so catfish to the warm river. She told Tim the next time she saw him that she would need a crew for a few hours at sometime in the next week. In the meantime she filled a couple tanks with water from the two places and put a couple fish in each tank. The Trout did well in the water from Big Lake and the catfish did just fine in the water from Warm River. The next week she moved one thousand trout to Big Lake and one thousand Catfish to Warm River. They both thrived on a minimum amount of food made from kitchen garbage. The catfish in warm river were soon larger than the catfish in the pond. The trout in the lake out performed the fish in the pond also. On the second week in the pond Grace was finding no more dead fish a day than she would have expected to find on Earth. Grace opened each trap door long enough to let a few fish out into the river from each species. Then she started feeding them the food that she made from table scraps, they also thrived. Grace had also sewn thousands of Earth worms along the banks of the lakes and rivers and made sure there was enough for them to eat. Within a month Grace had transplanted more fish to Big lake, crappie, blue gill and some more trout. Then she opened the gate to the ponds and left them open. Some of the fish still preferred the pond but most chose the river and the warm lake. The catfish seemed very fond of the warm lake. The water in Big Lake stayed a little warmer than most native Mars water because of all the heat being generated in the Utility cavern.

September 13, 2108: For two weeks Tim had three crews assembling, charging and testing golf carts. Tim himself got the first one off the assembly line. He could now scurry from place to place quickly. When the carts were all assembled they were put in a motor pool. Anyone who needed a cart for work just took one. When they were done with it they drove it back and parked it in the motor pool. If the yellow light was on they took it to the charging station and plugged it in. The lithium ion gel batteries that they used were good for about two hundred fifty miles or ten days which ever came first, before the yellow light would come on. There were never more than ten of the carts on the charger overnight. The surface carts could be used in the caverns but the cavern carts could not be used on the surface. The difference being that the surface carts had big balloon tires that would not sink into the dust that was on much of the surface. People working on the surface would just ride a cart over to the pedestrian elevator, go up to the surface and use the cart while they were working then return it in the evening. After five PM people would take a cart anytime they were going out of the original complex of the Government cavern and The Company cavern a lot of them could be found at the spa on any given evening. People could be found lining the banks of Big Lake, near the feeding

area and lining the banks of Warm River and the river and Lake in The Company cavern every evening spotting fish.

September 20, 2108: The gold mine had proved to be very productive. They were extracting not only pure gold from the vein but the ore on each side of the vein for several feet proved to be very rich in gold. They did not even attempt to smelt the ore on Mars. They did jury rig a crusher that worked well so they were just crushing everything produced in the mine. They made cement boxes that were filled with the gold and ore then sealed with cement, and cured before being loaded on the empty ships and sent back to Earth. The only way to get at the contents was to destroy the cement box. The boxes were not so heavy that two strong men on Mars could handle one box which weighed about one hundred lbs on Mars but weighed almost three hundred lbs on the ships and on Earth. These boxes had to be unloaded back on Earth with fork lifts. As far as anyone ever knew no gold had ever been pilfered.

September 23, 2108: The tunnel crew had a hard time digging the tunnel leading out of Big Lake and the Utility cavern. They ran into hard rock so went and consulted the mine foreman. He examined the rock and decided it was all part of the same vein they were pursuing from the Utility cavern. He moved the mine crew to the tunnel and they removed the 40 foot wide vein of gold bearing quartz before the tunnel digging crew could continue. The hard rock had finally been removed and the tunnel crew resumed work on September 27, 2108.

New tunneling equipment had arrived on August 12, 2108 and once tunneling had resumed it went much faster.

CHAPTER – The Ocean

October 7, 2108: The tunneling crew broke through to the third cavern on their way to Utopia. As soon as breakthrough occurred the scientists dressed in Mars suits descended on the place and started their measurements. The cavern was almost circular and covered about twelve square miles. Almost the whole cavern floor was covered by one giant lake. A warm spring entered at one side of the cavern and fed the large lake. There was a stream exiting the lake and flowing off into the a crevice in the cavern wall. The water temperature of the lake was a mild 68 degrees. Tim knew instantly that they had found Graces Ocean. He went to fetch Grace immediately and told her to bring her Mars suit and follow him. When they approached the air lock Tim put his Mars suit back on and told Grace to do likewise. While they were putting their suits on Tim asked Grace, “Do you remember asking me to enlarge the fish ponds because you were expecting a shipment of Salt Water fish on the Mars Runner when it docks in December?” “Of course I remember but what does this have to do with..?” “I’ll show you Tim interrupted.” With that they went through the

double doors of the air lock and Tim presented Grace with her with her Ocean. The natural water temperature here is 68 degrees and I seem to remember that on Earth they used to quote water temperatures in that range on the radio” “Yes 68 would be perfect.” “Great we should have this cavern sealed and pressurized within the week. We can install a reverse osmosis system where that water exits and use the output as household tap water. You can put your salt solution into the lake and when the reverse osmosis system filters it out you can put it back into the lake.

Luckily the floor was almost level with the tunnel so the drillers continued on their way

October 8, 2108: The four fissures in what they were all referring to as the Ocean cavern were sealed and a pressure test was run. One of the seals leaked a little but was quickly repaired. The cavern was pressurized by the end of the week.

October 9, 2108: Tunneling promptly began on the next long tunnel another nine hundred foot span. The digging went fast and easy. The workers never had to wear their Mars suits. Men were now working the tunnel around the clock. They were gaining more than two feet per hour at times.

CHAPTER – Mars Supply Two returns

November 15, 2108: Mars Supply Two docked, Mars was closer to Earth now and the travel time was a little less. The three hundred passengers that they carried were mostly construction workers. There was more lumber than the colony had ever had before. There were four hundred pallets of merchandise for Super Store and six new employees. The Company who had been operating the first class restaurant sent sixteen employees and a manager. There was enough equipment, supplies and frozen food to fully equip a first class restaurant. There were also five hundred cases of liquor. More was due to arrive in December when Mars Runner made its first docking at the Mars orbiter.

November 21,2108: The building for the restaurant had already been built in the square next to the Bank and waiting when the ship arrived The building had been plumbed and wired so it took less than a week to install the equipment. The restaurant opened for business Today. Prices were established at \$200.00 for a first class meal with two drinks Included but two more optional at \$10.00 each. Alcohol was limited to diners. The new restaurant dominated the talk radio program for several days.

CHAPTER – The Hour Glass

November 30, 2108: the tunneling crew broke through into their 4th cavern. This was another large and beautiful cavern similar to Paradise. It was almost a perfect hour glass in shape and as luck would have it they had broken through right at the thin part of the hour glass. When the powerful portable lights were shined in both directions they saw stalagmites, stalactites, and columns in every direction. It was later established that the hour glass had about 22 square miles of floor space. There were five lakes averaging ten acres each in size and all joined by a river that ranged from fifteen feet to 50 feet in width. The water here moved quite slowly. Soundings disclosed that the lakes were all more than two hundred feet deep and even the river ran over 50 feet deep in places. Best of all the water was warm. There must be magma somewhere here that is not too far below the surface. They didn't really need another park but it looked like they had found one. Once details of the Hour Glass cavern were released they dominated not only the talk radio show but Rusty spent at least half of his local news half hour discussing the new cavern and what it could mean for their community.

December 2, 2108: Tunneling starts to reach the fifth cavern, 1100 feet away.

December 15, 2108: The fissures had all been sealed and pressure tested and atmosphere introduced. The temperature in the hour glass was 86 degrees. Back in the Government cavern the temperature had been down in the forties when Tim and Carla first arrived and the caverns had to be heated for people to be comfortable. With the tunnels open and fans circulating the air the temperature had equalized at 72 degrees everywhere and nothing had to be heated.

December 15, 2108: Grace had more water than she new what to do with. She was trapping fish from the other ponds and introducing them to the lakes in the Hour Glass. Walkways were laid so as to encircle each of the lakes and along the rivers. It might be a couple years before the fishing got really good, and no one was allowed to fish at the Hour Glass lakes for over a year but the fish that Grace had introduced were thriving. Grace now had a full crew working for her doing nothing but making fish food, and migrating fish. Talk radio spent a lot of time talking about fishing.

CHAPTER – Mars Runner makes it's first docking

December 22, 2108: There was a lot of interesting and long awaited cargo on Mars Runner. The two items that got the most attention however were 150 twelve foot fiber glass fishing boat kits, They came disassembled with the boats stacked one inside the other. There were several large crates with hardwood seats, fixtures and oars. There was even 150 two horsepower electric trolling motors, which also came partially disassembled. Within just a few days everything was assembled before Tim ever got around to assigning a

crew to do the work. Soon there were boats available everywhere that fishing was allowed.

The second item of intense interest to the workers on Mars and their talk radio show was the arrival of the wine and beer making equipment and plants. There was also enough grapes hops barley and yeast ready to use for them to start production as soon as they were set up. They chose the hour glass for their operation. Byron and Austin had leased eighty acres from The Company they had already learned what they thought they needed to know to make beer and wine. In the public interest and because there was so much surplus labor around, Tim approved them having the use of four crews if they agreed to keep them busy. The brewery and two houses appeared almost overnight. Within the week the rest of their eighty acres had been planted in barley, hops, grapes and sugar cane. They even had volunteers showing up after work and on their days off to see if they could help. With their initial order they had ordered a supply of the Mars soil converter plus two tons of fertilizers and ten million Earth worms. The soil in this vineyard and farm would be very rich indeed. They first tried making their beer and wine in five gallon containers so as not to ruin too much of it if things didn't turn out as expected. What they got for their trouble was drinkable beer and wine but it was none too good. One of the construction workers that had helped them in setting up their facility tasted both products and said, "I thought you guys new what you were doing, this is slop," he said as he took another big drink. "I suppose you could do better, wise ass." "Oh hell yes, I was an apprentice with Barble Beer before I got this Job. I'll make you a deal' let me make a carboy (five gallon water bottle) of beer and if it is not better than this I will drink it all. Austin said "No matter who made a carboy of beer you would drink it all" "True." said Gene, the construction worker but seriously maybe I could give you some pointers." With that he went into the brewery, got out the equipment and proceeded to show them how to brew a small batch of beer. Ten days later it was ready to drink. "This may be the best beer I have ever tasted," Byron, Suds said "How would like a part time job as brew meister? Maybe I can do better than that. Gene called Tim on his cell, "Tim where are you?" Gene ask. "Carla and I are at the spa, who is this Gene?" Yeah it's Gene, look Byron and Austin and I have a deal for you we will be right there." They all three jumped into the cart that Gene had come over in and took off or the spa. They were there in ten minutes. "OK Tim here is the deal, I would like for you to give me a permanent assignment in the Hour Glass or doing something that would benefit The Company enough that you could justify it, have you got anything like that?" "I don't know of anything off hand Gene but I will keep it in mind, why the request?" "I'll tell you why Tim, I recently tasted some brew that these two dodo's made and you almost couldn't drink the stuff, it was terrible." "Terrible," Austin repeated. "Then I made them a carboy full of good beer and Byron said it was the best beer he had ever tasted. I know how to make beer and they don't. Since this is the only brewery on Mars don't you think it would be in the beer drinking publics best interest to have good beer?" "I agree but let me think, I know we don't have a park ranger in the hour glass yet and there are valuable natural beauty assets there that need to be protected. We already

have rangers on duty in paradise and The Company cavern to protect the fish, how would you like to be the ranger at the Hour Glass, Gene?" "Fantastic, I knew I could count on you Tim." So it was that Hour glass brewery got a brew meister and the folks on Mars got some really good beer.

Beer containers were a problem Austin and Byron hadn't thought of before ordering all their other stuff, but Gene had the answer, I will just put a large covered vat in the square and the customers can bring their own containers. The kitchens have hundreds of plastic jugs that stuff they use comes in and they have just been storing the empties in the back of one of the caverns in hopes they would be of use some day. Well we can retrieve a couple thousand of those jugs, wash them and give them to people that don't have containers when they buy beer from our vat. Three weeks later they had the vat set up and Byron was selling beer every evening from 1700 to 1900. Gene turned out to be not a very good ranger but he was a heck of a brewer. Most people swore that Hour Glass brewery on Mars made the best beer they had ever tasted. Byron and Austin made so much money that they bought out Genes contract with The Company and made him a partner. In the meantime Gene, who was actually a pretty sharp guy had been hitting the Internet- and boning up on wine making. After several hundred hours of study he thought he was ready. He got out the ingredients and the equipment and proceed to make a carboy of wine. It was a burgundy and it was pretty good so after Austin and Byron approved he started making vats of it. He then tried a Chablis which was also pretty good and Gene figured considering the competition it was good enough. Within six months they were also selling table wine in the square, no one seemed to rave about the wine like they did the beer but they bought it anyway.

Also among the items that were brought in on Mars Runner were an assortment of salt water fish and enough mixture to convert ten million gallons of fresh water to salt water. Helen asked,"What do you need that stuff for, we have plenty of salt in the caverns, there are big deposits of it. Grace told Helen "There is a lot more than just salt in this mixture, Helen this is the residue that results from the dehydration of ocean water. There are hundreds of nutrients in this mixture that salt water fish require. For the next month Grace and Helen and three crews were busy setting up the Ocean and introducing the salt water fish.

CHAPTER - December 31, 2108: Happy new year 2109

January 7, 2109 : Tunneling starts to reach the long low 6th cavern nine hundred feet away. This was a new experience for the drillers. So far the caverns had been close enough to being on the same level but this dig was at a six percent down grade the whole way. It was difficult to keep loose material from getting in the way. A front end loader was constantly removing the loose

material. After a while they got the knack of it and started making pretty good progress. At one hundred feet in they ran into solid quartz. They summoned Harold Dixon, the mine manager "what do you recommend we do about this Harold?" "This is a good thing and a bad thing, I would like to take some samples for assay and I would like for you to tunnel to get a crawl space to the other side. Also get the scientists to get you some pictures of what this looks like, I need to know the size and contents of this formation. Is there another route you could take to still get to Utopia?" "There is a longer way, yes, Lets get Tim and Carter and see if they have any idea's." "A few minutes later Tim showed up with Hal Johnson, and all the charts of known caverns in the area. If you went to the side of the hourglass away from the winery and changed direction and dug off to the right of the hour glass you would only have a short dig 150 feet to a very large cavern that we can tell little about but we know that it is almost 68 square miles in size and we really didn't want to have to pressurize a hole that big at this time. Now, however since we have additional atmosphere apparatus and have that big generator that we were thinking of using in Utopia we could use it in that big cavern, assuming there is water and a hot spot somewhere in there. If not we could lay down an air tight tunnel which would be twelve miles long and then tunnel another two hundred fifty feet and we come out in this little arm of Utopia." Jonson mumbled as he ran his finger over the chart. Harold said "I would like to see you guys go that route and leave this quartz to us hard rock guys, there is no way to tell, of course but I smell gold there." as he pointed to the quartz barrier. "Why don't you guys knock off for the rest of the day and I will have new marching orders for you in the morning. Tim and Hal went back to the Government cavern and connected with Paul and Carter. Johnson explained the plan change to them and they agreed. "If Harold wants that quartz lets give it to him and take on the little giant instead. I always kinda wanted to go that way in the first place. It was just the challenge that cavern poses to our environmental facilities that sent us on the route we were taking anyway.

January 20, 2109 The tunnelers started their dig again, this time to the little giant. They ran in to lots of rocks but still managed to make pretty good headway. The rocks were all being sent back for the scientists to study and identify. These guys didn't know much about rocks but generally the harder they are the more valuable they are, and these were very hard rocks, a hammer wouldn't break one or cleave it.

CHAPTER – Breakthrough To the Little Giant cavern

February 14, 2109 The tunnel crew started work that morning in their Mars suits with the airlock closed behind them. At 1042 one of the men hit the wall with his pick and it went right on through. They finished opening up the hole and only had to step down one foot to be standing in the Little Giant. This was by far and away the most beautiful site they had ever seen on Mars. "Who

wants to reach Utopia, one of the men said, I think we have found it." This cavern was almost 20 miles long and almost 15 miles wide, 20 in places. The floor of the cavern was covered with scrub brush like you would see in Arizona, There were majestic cacti growing and in bloom with flowers, some of the plants resembled giant saguaros some prickly pear and many other nameless varieties. "With plants here the air must be breathable" "I already took a reading it might be breathable but it is still very high in CO2. Once this cavern is sealed our smallest atmosphere apparatus would keep it breathable. If it weren't for the size of this place I would say just open the airlock and let it equalize. The five hundred foot high sealing gave off a soft phosphorescent glow like you would see on Earth just before dark. They could see a small mountain chain in the distance. They were low but rather than being shaped like hills they had peaks like real mountains. That night they sent one hundred guys in Mars suits inside the cavern shining their lights up at the ceiling and had another hundred guys in Mars suits looking for the light beams to break through. Most of the cavern was covered by a mountain on the Martian surface. The guys on the surface only found two small fissures and they filled them right then and there with balloons dropped down ten feet into the fissure and then inflated. They marked the locations then went back to the Government cavern. Tim, Paul and Carter visited the cavern within the hour of it being opened. "We just have to call this one Arizona," Tim said. They all agreed but it didn't matter, the tunneling crew called it that the moment they saw it. The next morning with the temporary air seals in place from the night before they started their pressurization test that took almost all day. When it finally passed and was declared air tight they just opened the air lock and let the atmosphere in their whole system equalize. The heat also equalized and the atmosphere machines made short work of the little rise in CO2. The cavern was first opened to the scientists. The more they looked the more they found, Including several fire pits and many petroglyph's. People had once lived in this place before the CO2 finally got them. Several photographers walked around the walls taking still pictures and video's, the photographers then criss crossed the entire floor of the cavern and photographed everything, that took five photographers a week. But now they had it for posterity. Arizona turned out to be 368 square miles in size not 68 as they had thought. Somehow the photos they had taken twelve years earlier on a flyby had failed to accurately catch the whole cavern

Arizona was the only thing people could talk about. There was a small creek feeding into a large almost dry lake bed. Samples had been taken of the water and of the lake bed . That was not a problem, they already had more water than they could use. All they had to do was to pipe it in.

February 20, 2109: Tunneling starts to reach Utopia two hundred fifty feet away.

March 5, 2109 Mars Supply One docked and unloaded four hundred more pallets of merchandise for Super Store. This time they brought 20 pallets of fishing gear. So many residents had complained to Charlie Rasmussen

about the lack of fishing gear and the presence of fish on Mars that he thought he would go overboard and over order on fishing gear.

With each ship that docked there were more and more of the Government employees that were finishing their contracts and were eligible to return to Earth, fewer and fewer of them did, however. Most stayed on as independent citizens of Mars. Mars.com had even gone to posting help wanted ads and people were posting job wanted ads but that was really unnecessary because you could cover all the business on Mars in a couple hours and they were all hiring. The pattern of remaining on Mars taking a job then researching some kind of business you wanted to go into then ordering your business equipment from Earth then opening for business soon developed. Mars now had an insurance office which wasn't doing too well a one man attorney firm that had no clients but they did have a sign on the door to call the attorney if you wanted to talk to him.

March 5, 2109 : Super Store now had a lot of merchandise to offer the customer and a pretty good selection but they had sold out of fishing gear. It was hard to find a place to stand along the banks of the fish bearing waters of Mars. I guess that since they didn't have many other sports then fishing had to be the sport of choice. Like on Earth some caught fish and some didn't but on Mars you had to deposit them in a bin that was sent to the kitchen. When the bin was full everyone had reached their limit and the rangers made everyone quit fishing or start throwing them back. If the kitchens had enough fish they would not put the bins out and no one was allowed to fish unless they threw them back. If you were a householder that had elected to be paid for separate rations rather than to eat in the mess hall you were able to keep three fish to cook at home. Everyone on Mars carried an ID card and those on separate rations had that fact clearly stamped on their cards before they were laminated.

Because of the growing number of privately owned vehicles they found it necessary to establish a Department of Motor Vehicles and to start issuing license plates and drivers licenses. Every time they turned around a new necessity arose and more jobs on the private and on the public sector arose to fill the need. One interesting development was that many of the new agencies were governed by the council and not by the Federal Government or the company.

Abner complained that fishermen were showing up at the farm by the dozens looking to buy worms. That evening Abner ordered ten million worms to be sent to Mars at his expense. He also ordered ten thousand disposable cups with lids. He would go in the worm business if there was that much demand.

CHAPTER - The breakthrough to Utopia

March 7, 2109 : The breakthrough to Utopia was kind of anticlimactic.

The cavern was huge, much larger than Arizona. There were 967 square miles at floor level but it was a dead cavern with lots of fissures to fill and the floor would need lots of leveling. The floor level of Arizona where they tunneled from broke through to Utopia 20 feet off the floor. They just sealed the airlock and declared their work done for now. They had reached Utopia and someday some future generation could tame it. They could do the job but they didn't need anything that Utopia had to offer and wouldn't for years to come. They would have their hands full developing what they had already discovered and tamed.

In the next year the space ships would continue to arrive and bring with them more people, more equipment, more businesses. Tim had a hunch that Arizona, Mars would begin to look a lot like down town Phoenix.

In the five years since Tim had become company manager The soil in the Arizona cavern had been plowed and brought to life. Grow lights had been installed one hundred feet off the cavern floor over the 160 square mile agricultural area cavern. Ranch experts had been brought in and 20 square miles had been dedicated to raising swine, goats and sheep. Fruit and evergreen trees dotted the land. A new farm manager had been brought in to grow alfalfa, wheat, barley and oats on another ten square miles of the surface. Abner did not want to give up his little farm in the old company cavern so he still produced eggs, rabbits, poultry, fruit and vegetables there. The growing number of householders who now had kitchens and preferred to prepare their own meals also preferred to obtain their food from Abner. What Abner produced was minuscule to what the new farm manager was raising on the acreage that he had under cultivation in Arizona cavern but Abner's products were considered superior in quality. The new householder's were paid an allowance from The Company for not taking their meals in the mess hall. They used these funds to buy their food at the Supermarket which had become a part of the new Super Store . The money that Abner took in from selling his products had to be strictly accounted for and turned over to the company. The Company did still own Abner's farm and Abner was still a Company employee.

Ten square miles of the surface of Arizona was the industrial district. They now had their own smelter, foundry, machine shop, plastics fabricating plant, a flower mill a commercial bakery and a lumber mill, installed and just waiting for their trees to get large enough to harvest so they could start cutting their own lumber.

Near the cavern entrance a small city had sprung up. It had been dubbed New Phoenix. Almost everyone on Mars was moving to New Phoenix.

There was a whole new generation of engineers and scientists at work digging new tunnels and opening new caverns. Mars itself could now support a population numbering in the millions but the three working ships could only transport so many passengers, about 2,400 per year. As new caverns continued to be opened and pressurized there were a few individuals that for one reason or another wanted to live in them. Mostly these were farmers and

ranchers. Some planted cotton, some trees, some wheat or other grain crops. The new caverns were being put to good use.

One of the new caverns about four miles out from Arizona had a unique set of features. The cavern covered about sixteen square miles but the floor was certainly not level. It would have been a tremendous engineering feat to even have attempted to level it. The floor of the cavern looked like the side of a mountain on Earth. The cavern had been tunneled into at the low side. It would have been impractical to have allowed for such a steep climb to exit the cavern so the crew just left the air lock in place. They drilled another tunnel out of the previous cavern into the next cavern off to the right of the sealed cavern. The floor of the new cavern that they reached was relatively flat. They just continued on through that cavern and continued opening new caverns. They figured the steep sided cavern would never serve any worthwhile purpose.

On an inspection tour Tim donned his Mars suit and asked to enter the sealed off cavern. After seeing it he couldn't get it out of his mind. He came up with an idea. After talking with the atmosphere control group he was elated. He wrote up a proposal under the name of one of his corporations. He plainly stated in the offer that he was not only the CEO of that company but that he was the only stockholder. Tim offered to purchase the cavern for one million dollars. He was first told that he should submit it through the Company, Mars Colony, Inc. since they owned the abandoned cavern, but when he pointed out that it would be a conflict of interest for him to do that because he was the Company Manager, they agreed to have the Council act on approval of the offer. The offer was accepted but no one could understand why Tim wanted the useless cavern. The purchase was made with a ten percent down payment and payments for 30 years at seven percent interest.

Since there were so many people wanting title to the land they lived on Tim decided to have a couple with Real Estate appraisal experience start appraising the property that people occupied and setting a price for purchasing the real estate. The bank had agreed to make thirty year mortgages with ten percent down at 7% interest. The first applicant was Abner Jacobs, who had recently formed a new closed corporation with the three couples who worked the farm as the only other stockholders. The Company was called Paradise Farms, Inc. They wanted to buy the entire Government cavern and the old company cavern and the orchard. They did not want to buy the installed utilities but agreed to give The Company access to them. The appraisal came in at only eight million dollars and Abner jumped at it. He transferred \$800,000 from their corporate bank account to Mars Colony, Inc and all the principals signed the mortgage papers. From then on when you crossed from Paradise to the old area you encountered a new sign that read "Welcome to Paradise Farms."

Hour Glass, Inc. was the next company that wanted to purchase the land that they leased from the company. Unlike Abner's farm they had been private a enterprise business since Inception, it is just that had leased their land from the company. The appraisers were instructed to appraise the value of the

raw land only and not the crops and improvements which had been installed by the tenants. Their appraisal for just the land came back at 26 million dollars and Hour Glass, Inc. opted to buy it. They could have paid all cash by this time but took the mortgage anyway.

Many of the factory managers of production facilities located in New Phoenix quickly formed new corporations some were closed corporations and some were traded on the over the counter exchange operated by Paul Silverman. They obtained appraisals and in all cases the corporations bought the businesses, land, buildings, machinery and equipment. A couple of them had thought appraisals had come back a little on the high side and had ask for a hearing. The two attorney's would plead the case before a committee designated by the Council and the Committee would render a verdict. They usually split the difference and everybody had thought they had won the case. After attorney fees they had both lost.

@CHAPTER – Mars Runner Returns

May 28, 2109 : Six hundred new immigrants were on board, half of them to open more than fifty new businesses, the other 300 were workers for Mars industries. Cargo contained the machinery and equipment, furniture and fixtures to expand existing industry on Mars, and the for the new businesses.

June 18, 2110: A new one hundred bed hospital opened in New Phoenix equipped with all the latest medical equipment from Earth. The staff Included at a minimum, two specialists in every major category of medical arts. There was a new small medical college program started a year later with 22 students in the first class. Practicing Dr's served as the instructors. Upon graduation the students were to serve a two year stint as interns and then an apprenticeship with the doctors who were practicing the specialty they had selected. Pediatrics and family medicine were very popular but there were two doctors in New Phoenix practicing family medicine who had specialties in geriatric medicine though there were no geriatric patients at this time.

Abner finally got the Earth worms he had ordered, along with the cups, lids and five hundred pounds of corn meal that would feed them for years. He got permission to raise them on a small plot of land at the farm. The worms multiplied rapidly. Abner did not start selling them until his stock had doubled then he let everyone know over talk radio that he had worms for sale. Business was brisk. Abner and the other five people on the farm only worked with the worms for sale when they were off duty but they were allowed to keep the money that they earned.

The fish had a chance to mature and multiply. Fishing was now fair to good in more than thirty lakes and streams on Mars. Boats with electric motors trolled the lakes, people partied and cooked on the docks.

As predicted the Ivy had spread, climbing up the walls of all the caverns. Now when one traveled anywhere on Mars they got the impression that they were in a place of lush greenery because growing greenery was what the eye caught no matter what direction one looked. Most of what they were seeing was Ivy but all of the gardens, vineyards and orchards were thriving.

September 14, 2110: One of the women who had remained on Mars when her contract was up with the Government approached Abner one evening. Abner I took a job at Burger Boy because I couldn't decide what kind of business I would enjoy working at. I have enough money to go into business for myself and I do a lot of fishing. I think what I would like to do is to open a bait and tackle shop. If I did that would you keep me supplied with worms. The worked out a deal for Sarah to market the worms. Sarah then placed a large order with a sporting goods wholesaler in California. The next thing she did was to have friends of hers and the people working on the farm go to Super Store and buy all the fishing gear they would sell them. Once she had all the new fishing gear on Mars she leased the lot built the building in the square at The Company cavern and hung out her shingle. "Sarah's Bait and Tackle Shop" Everyone on talk radio could talk of nothing else for a few days. Some of them were not too happy because Sarah had doubled the price that she had paid Super Store for her inventory and raised the price of the worms that she got from Abner. People grumbled a little but they understood. Sarah became the local fishing guru and gave free advise with every item she sold. Within six months she had received her own inventory from California and Super Store had replaced theirs. Sarah's business was a success and Sarah was a very happy camper.

February 3, 2111: Over the years since Tim and Carla had arrived, a few pet lovers had bit the bullet and paid the one hundred thousand dollars fare to have a dog, or a cat and a few cases even a parrot brought to Mars. Tim had finally realized that on Earth having a pet around was a part of growing up, and the kids now growing up on Mars were missing out on this experience. With the arrival of each new ship there was less and less demand to Include only critical items on the cargo manifest. Also there was the fact that Mars was now able to provide ample food for the population and still have a surplus. Tim had arranged for one couple who had completed their contracts with the Government to open a pet store. He also arranged for them to be able to import up to one hundred pets aboard every ship that arrived from now on to be shipped for \$100.00 each, providing the pet store owner agreed to no more than double his money when he resold them on Mars. The pet store owners proved very canny and began to purchase females that were pregnant or in heat. By 2117 there would be thousands of pets of every kind on the planet. So many that New Phoenix had to establish an Animal control agency and a pound, where pets could be adopted. No pet was ever subjected to euphemism on Mars.

April 4, 2112: There almost one hundred children in New Phoenix due to start Kindergarten but so far there were no schools. Not only were there almost

one hundred this year but there would be twice that many next year. Tim authorized funds to build and equip a school. Tim provided enough land but only authorized hiring or reassigning enough teachers to handle Kindergarten and preschool programs. Tim warned the council that this facility was hereby donated to them and they should construct the buildings and hire the teachers by next year when they would have first graders to contend with. This led to the bank putting up the funds and the local Government obligating itself for repayment. The council became disparate and had to figure out some kind of tax scheme to support the schools. They debated all sort of taxes but there just wasn't enough tax base to provide the funds that they required short of imposing an Income tax.

May 15, 2112: The council enacted an Income tax bill, then realized they also needed an Internal Revenue Service to collect the tax. Sooooooooo on....

May 16, 2112: They created the IRS of Mars. This served as an interesting beginning to a very familiar cycle. They had already realized some Income from DMV fees, but they started considering a duty tax also. As a result of this the first grade classrooms were built, equipped and staffed with local tax revenue. So far so good but they had the second grade looming over their heads.

CHAPTER – Mars gets a Zoo, Tims Investment

August 12, 2116: Tim was at home one evening and little Jimmy who was now in Kindergarten was looking at pictures in an Earth book entitled "A Day At The Zoo" Jimmy kept asking Carla and Tim about the animals that he saw in the book. Tim and Carla did the best they could to explain each one to him but finally Tim said to Carla, "That does it we are going to have a Zoo in New Phoenix." Six months later the zoo was a reality only The Company intervened to a degree. The Company had a mandate in their contract with the Government that they had signed years before prohibiting them from exporting any animals from Earth that could be considered a threat to mankind. They couldn't send venomous snakes because they might bite someone, they couldn't send bears because they might maul someone, they couldn't send wild cats because they might attack someone, and they couldn't send elephants because, well, they were just too damned heavy to handle. Mars got it's zoo but it mostly contained llamas and alpacas and the like. They got five Panda's, some kangaroos and other harmless Marsupials a large variety of harmless bird species. Actually Panda's and kangaroos could harm people but the company fudged a little on the rules for certain animals.

Parrots abounded on Mars. Most were wild but many people had tamed them for pets. There were more than twenty varieties of parrots. They could be found in all the caverns. The Zoo had opossums and raccoons and badgers and penguins but nothing that man need fear. There were even twelve head of

Cattle brought up from Earth and displayed at the zoo. Even though cows produced an enormous amount of methane the atmosphere could handle twelve of them. The herd was never allowed to become larger than that. The surplus animals were slaughtered for meat but the kids never knew that. It was OK with the kids that there were no dangerous animals, they loved going to the zoo. Chimps and monkeys proved to be the most popular with the kids. Ant's and flies didn't really belong in a zoo but the zoo had those also. They, it seems had invited themselves.

March 21,2117: The value of Tims stock in Mars Colony, Inc. had gone up one hundred fold in the nine years he had been buying it. He figured the time was right to get out of the market, draw his Swiss Account down to one hundred dollars, cancel his trust agreement with his bank on Earth and then somehow arrange to have the funds transferred to his account at First Colonial Bank in New Phoenix. He felt he could better handle his investments himself in New Phoenix. Tim worked out a deal to have Paul's family arrange the transfers. Of course Paul's family charged a ten percent handling fee but there were no inquiries from the IRS. When all was said and done Tim ended up with a little over one hundred million dollars divided up between his seven different First Colonial accounts.

March 23, 2117: The first thing that Tim did was to order twenty million dollars worth of products from Earth. These included Redwood, Cedar, Glass, furnishings for hotel rooms, furnishings for a first class bar and restaurant and two million dollars worth of winter sporting goods. Tim also ordered over one thousand warm hooded jackets. The items were all promised for delivery within the next six months. Tim contracted with the private sector to have his sloped floor cavern sealed and pressurized. The temperature inside the cavern was a consistent twenty nine degrees.

Tim once again contracted with a private sector firm to do extensive grading and sculpturing of his hillside. The hill was more than a mile higher at the high side than it was at the low side. After descending for four miles it leveled off making a flat plane extending to the far wall on the low side.

Tim purchased an old atmosphere making apparatus that was now being stored in reserve. He had the machine installed in his cavern. With the modifications that he already knew could be easily made he had a new control installed on the machine that raised the moisture level of the atmosphere in the cavern enough to generate falling snow when it was set above a setting of seven. He turned it to eight and let it snow. The next ship to arrive on Mars brought the building materials that Tim had ordered. The next brought the equipment and merchandise. Tim had a new three stage automatic opening airlock installed in the tunnel leading to his property. The tunnel had been expanded to allow for one lane of traffic in each direction as well as a moving sidewalk to accommodate pedestrian traffic in and out of the facility. The traffic was channeled into a huge cement block building with a parking lot, benches tables, several fast food restaurants and several other small businesses . One

of the small business sold and rented Nordic clothing, another sold all sorts of ski paraphernalia. There was a desk manned by several employees seated at terminals that made reservations and sold entertainment packages that included food and lodging while vacationing in the cavern. The one week beginners package included seven days and six nights with unlimited use of the ski lift, a room and all meals for \$6,000.00 beginners were eligible to attend as many beginner classes as they wanted when they bought the beginners package. The entry building was always heated to a comfortable 74 degrees. There was an exit triple sliding doors at the back of the building leading into the cavern. Large signs warned the patrons not to pass through these doors unless they were dressed for cold weather. Once inside the cavern the customer could board a free tram that would whisk them away to the Lodge. Just beyond the lodge there was a one hundred acre skating rink that was always open and always available to the public without charge. Of course the only place on Mars that sold ice skates and winter clothing was Tims store in the entrance building.

By the time the project was completed and opened to the public Tim had invested virtually all of the money he had accumulated. The ski lodge proved so successful that Tim started recovering his investment in record time.

CHAPTER – New Phoenix, an American City

September 27, 2117 Tim and Carla Look back on their Mars Experience: Tim sat at a table with Carla and little Jimmy in Downtown New Phoenix. They were at Pablo's Mexican Restaurant, Carla was drinking a glass of Martian Chablis that had been re rated from good to excellent. There were 427,520 acres in New Phoenix and Tim had his. With a five bedroom ranch house sitting on it, unlike most homes Tims home actually had a roof and doors and windows just like they had on Earth. All of the furniture had been selected from the internet and ordered from Earth. Some of it had arrived and some of their furniture was still en route. In the meantime they were making do with the cheap knock down stuff. Tim's home was equipped just as it would have been on Earth with an up to date all electric kitchen, flush toilets, everything that any home maker on Earth could want Carla had on Mars. "Tomorrow is an anniversary for us Carla, it was ten years ago tomorrow that we first set foot on Mars. Our contract with The Company is up tomorrow. How about it, do you want to return to Earth?" "Carla gave him a quizzical expression and said "What are you nuts, I don't even want to go there for a visit.

December 31, 2117, January 1, 2118: Revelers had packed the downtown area to see the new year in. Tim and Carla were having coffee at home and listening to Rusty on MARS-TV. Rusty had described the way things had been at that New Years celebration ten years earlier when they had only two caverns. Rusty then launched into a rundown on the status of things today.

What a difference ten years had made.

“The Mars orbiter has been repositioned over the Utility cavern and everything and everyone that arrive from Earth is deposited there. Abner's farm and Graces fish hatchery are all that remain in the old company cavern. The almost dry lake at New Phoenix has been filled and populated with over 20 varieties of fresh water fish. The old Government cavern would look like a ghost town except that everything that could be pillaged has been. Abner has been talking about planting more fruit trees there next year once he gets more grow lights. All the bureaucrats now work out of the new State office building in New Phoenix.”

“The Winery has usurped the entire half of the Hour Glass where their original winery and brewery once stood. The facility now covers some nine thousand acres. One thousand acres are now planted in corn. The new distillery started bottling a whiskey made from eighty percent corn two years before. Their new product comes out at 160 proof, eighty percent alcohol. Many of us are feeling the after effects of that product this morning.” (Hour Glass Corp., or as the local people called it 'The Glass' had intended to age the product in wood but were never able to acquire the necessary casks.) The Martian grapes are magnificent, a bottle of good Martian wine will fetch \$500.00 in New York. Most of the output however was consumed on Mars. The brewery even sold their beer in bottles now but there were still those that swore it was not as good as what they used to get in the gallon jugs.)

“A paved concrete highway runs all the way from Abner's farm through Paradise, which is now a State campground. and the ocean cavern which has become a very popular salt water fishing resort, then through the Hour Glass and on in to New Phoenix. We now have over one hundred paved streets in New Phoenix and room for many more when they became necessary. The population of Mars is now 28,600 and growing because ten percent of the population is under eleven years of age. The downtown area has begun to look like the downtown area of any other small City. Now the workers that were here to see the new year in in 2108 have completed their contracts. They are eligible to return to Earth but few of them want to. Some of the Government people who had finished their ten year contracts and left Mars had returned within the year.” Rusty's ramblings got Tim to thinking of some of the other developments. There were six public bus routes running. There was one route from each quadrant of the city into city center. There was one from the city center out to the industrial area. There was one from Abner's farm through Paradise, Big Lake, the Hour Glass, the Ocean and on into city center. The Ski Lodge sent a bus back and forth to city center but that was not part of the public transportation system.

“Paul was still on Mars but was no longer the Director of the Government operations he had opened a jewelery store and was making fantastic jewelery with Martian diamonds and gold, for sale on Earth. Tim and Carla had realized two and a half million dollars from his find. There were no

other diamonds found on Mars for almost six years and Paul was able to contain the news of those finds and had most of them in his vault at the jewelery store. So as not to ruin the diamond market on Earth. Actually there weren't that many but there were enough to make Paul a very wealthy and happy man. Paul had two of his nephews brought up to Mars with their wives and children and they worked in the store with Paul. They weren't really his Nephews but he referred to them as his that. It looked as though there would always be a community of ascetic Jews in the diamond business on Mars," Tim mused.

"In 2111 Carter Fredrick was diagnosed with cancer and died in 2112. Many types of cancer were now treatable and curable, but not the kind Carter had. Tim of course was selected to replace him as manager of Mars Colony, Inc. on Mars.

January 2, 2118: Tim's salary was raised to \$65,000.00 per month. Over the last ten years the government's role on Mars had continued to diminish while the companies role had grown. Though Tim wouldn't admit it he was now the most powerful man on Mars. In effect he was the most powerful man in the universe, he ruled an entire planet, and his appointment was for life. The President of the United States had to be elected to a limited term of office. Hal Jonson was now Superintendent of construction.

CHAPTER – The new frontier, ARTON

A new planet was being developed and populated by man in the Alpha Centauri system that was almost identical to Earth in size and atmosphere but it was still in the age of the dinosaurs. New space craft developed on Earth could accelerate to ten times the speed of light. It didn't take much longer to travel to the new planet Arton than it took to travel to Mars in one of the old ships. It looked like there would never be another Mars ship built and both Mars and Earth were satisfied with that arrangement. Mars had now reached the point of self sufficiency and could survive indefinitely without ever being visited by another space ship. The two Mars Supply ships and the Mars Runner were too slow to be put to use anywhere else so now they were just vehicles used for interplanetary trade between Mars and Earth and for transporting more colonists to Mars.

February 4, 2118: "Tim was curious about Arton and the ships that navigated deep space so he gave George Schultz a call and asked him, "George, what can you tell me about Arton and the ships that fly people there?" George said I am headed for the observatory right now so why don't you meet me at the elevator and I will give you the whole rundown. Tim met George a few minutes later. They got boarded the elevator and started their ascent.

George began, "When man succeeded conquering the the sound barrier

it became common jargon to refer to the speed of sound as Mach One. Early Science Fiction Writers, well over one hundred years ago writing about ships that would exceed the speed of light dubbed the speed of light as Warp One and a ship traveling above that speed as traveling at Warp two or Warp five or whatever. That term stuck and today we refer to a ship traveling at eleven times the speed of light as traveling at Warp 11."

I guess you know, Tim that Arton is an Earth like planet in the Alpha Centauri system. It was discovered about thirty years ago by an observatory orbiting around Earth. It has two suns visible so it has long days and short nights. It has no moon. The Alpha Centauri system is about 4.5 light years from Earth and is the nearest solar system to Earth. When they built the Mars Supply One they discovered that an atomic powered space ship could continue to accelerate indefinitely. They didn't want to put too much strain on the Mars Supply One but while it was in the testing stage they did on one occasion push it just over Warp one. They didn't exactly disprove Einstein's theory of Relativity but they did prove that it did not apply to traveling faster than the speed of light."

"A much larger ship than Mars Supply One was the next space ship constructed. It carried a reactor that put out ten times the the power of the one on Mars Supply One and carried engines more than ten times as powerful. It was dubbed the Arton One, after the planet and the planet was named after the man who had discovered it, Jose Arton. After a maiden voyage to Mars and back it went on a mission to Arton. On that first mission they were able to accelerate to a speed of eleven times the speed of light and on the trip out the ship averaged a speed of nine times the speed of light. The speed of light never turned out to be the barrier that man had always thought it would be. The part of Einstein's equation that dealt with time travel commencing when the speed of light was exceeded has still never been put to the test. It is kind of like the question "If a tree falls over in a forest does it make any noise if there is no one to hear it" The crew of the ship found out that a voyage that should take six months took six months. When they made Arton orbit they never knew what day it was back on Earth and had no way to find out. Radio waves traveling at the speed of light would take four and a half years to reach Earth and they would be back on Earth in six and a half months. Since completion of the A1 the United States has completed a total of four Arton ships, they have been dubbed the Arton One, the Arton Two, the Arton Three and the Arton Four." The ships have more formal names but no one uses them.

Tim asked, "What would happen if a ship traveling at that speed hit an object in space?" "So far an Arton ship has never hit a space object while traveling at warp speed, or if it has it never knew it. We suppose that if a ship traveling at warp speed were to collide with an object, say the size of Earth's moon it might penetrate the surface to considerable depth and when the speed was no longer greater than the speed of light the ship would just come to a stop and be lodged forever in the moon sized object. Apparently, since large objects in space are rare and far apart the men piloting the ship can see them light years away, in plenty of time to avoid a collision. There is a lot of space junk in

our solar system so when a ship enters the solar system it reduces speed and proceeds through at sub-warp speeds. Instruments then warn of any object in plenty of time to avoid hitting it. The Arton ships are gaining more confidence in navigating within the solar system and are constantly increasing their speed. The Arton ships have also been fitted with new retro engines that can slow them from near warp one to 86 thousand miles an hour in less than one hour without causing the crew any distress. It is marvelous what they are doing with those ships now, Tim."

"Communications is the biggest problem. We have never figured out how to make radio waves travel faster than the speed of light. Virtually the only way for us to communicate with Arton and the colony that is thriving there now is by space ship. It would take nine years for you to send a radio message to Arton and receive an answer, so every outgoing ship carries hundreds of messages for Arton and every incoming ship carries replies. There is no way to communicate with a ship traveling at warp speed, radio waves would never catch up to them."

"We have been colonizing Arton for over eight years. The population is now in the thousands. They need people more than anything else. It is a planet rich in plants and minerals. Of course they have transported a lot of machinery and tools to Arton but mostly people. Each ship the A1 and now the Arton Two make one round trip a year. They have at times carried up to three thousand people on one flight. Without cargo they can be rigged to carry five thousand people because the cargo hold can be pressurized."

Tim already knew that there were many varieties of mineral ore becoming scarce on Earth fortunately they were plentiful on Mars. Several were being successfully mined on Mars and shipped back to Earth on the empty ships returning from Arton.

While he was talking George had been making adjustments on the telescope. George said "Watch that monitor on the wall over there Tim." The twelve foot by eight foot screen flickered briefly then displayed a group of stars. George activated a hand held pointer that projected a red arrow on the screen. He moved it to near the center of the screen. "You see that double star right there Tim, Arton orbits the sun on the left, Arton passes between the suns once a year. This causes long periods of daylight during that season. Fortunately they are far enough from the sun on the right so that the heat does not increase significantly it just stays daylight or what we would call twilight for a couple months a year.

"This light right here" George said as he pointed to a dim light just to the left of the sun on the left. "This is Arton." Tim studied the view of that part of the heavens briefly. "Thanks George, thanks to you I can now picture things much better."

CHAPTER – Mars is being slighted

2118: There really weren't that many qualified people left on Earth that wanted to migrate to Mars. Arton was where the action was now. The two Mars Supply ships were beginning to show their age and there was talk of retiring them. That would only leave Mars Runner in active service. If they did retire the two older ships then they would have the ships returning from Arton stop at Mars and load up with supplies destined for Earth from Mars. In that way the population of Mars would continue to grow by about twelve hundred immigrants and six or seven hundred natives per year. That would be a sustainable growth rate that Tim figured Mars could live with for a thousand years.

March 4, 2118: Instead of retiring the Mars Supply One and the Mars Supply Two the company had received a very attractive offer from Regency Cruise Lines out of London. If Mars Colony Inc. would sell Regency the two ships for one dollar each Regency would extensively remodel them and keep them in service as tourist cruise ships. Regency agreed to transport up to ten passengers each way to and from Mars for as long as the ships stayed in service, at no cost to Mars Colony, Inc. Regency also wanted at no cost to them a five acre site in New Phoenix where they could construct a top rate hotel. Mars Colony Inc. figured out that would be tantamount to selling the ships to Regency for one hundred million dollars and it wouldn't cost Mars Colony, Inc. for keeping the ships in moth balls or dismantling them. The head office of Mars Colony, Inc. in San Francisco made the deal without even consulting Tim on Mars.

April 15, 2118: Regency had committed three billion dollars to this deal. They figured that it would cost them one billion dollars each to remodel the two ships, one half billion to build the hotel in New Phoenix and another half billion to buy the ski cavern on Mars.

Tim couldn't believe his eyes when he received the offer from Regency Cruise Lines to buy the ski resort for five hundred million dollars. Tim had built the whole project out of his own cash accounts in his various corporations. All he owed was about nine hundred thousand to First Colonial Bank, on the real estate. He had paid cash for all the improvements. Not only that but he had already recovered most of his original investment. Tim didn't even try to get them to increase their offer, he just accepted it. Most of what he received was paid in the form of stock in Regency Cruises, Inc. When the transaction became known on Wall Street the value of Regency stock immediately doubled in value and Tim sold. The funds were transferred to Tim's various accounts at First Colonial.

June 4, 2120: Tim later saw an ad on the internet for Mars eighteen month Mars ski vacation packages and first class accommodations. This package included taking a first class cruise ship to Mars and back and up to six months on the planet with option to stay at the Grand Regency in New Phoenix and or The Ski Lodge plus many other perks. Packages started at two and a

half million dollars or four million for two people. Apparently word had filtered back to Earth about how much more fun it was to ski in low gravity. Tim was forever amazed at how many people had the time and the money to take one of these cruises. More than a thousand tourists arrived on either the Regency King or the Regency Prince twice a year. Apparently Regency had made a good investment. Regency even cut the price that Tim had been charging Mars Locals to use the ski lift facilities and to stay at the lodge although staying at the Regency Lodge was on a space available basis for the locals. That didn't matter much because anyone on Mars could reach the resort by golf cart in less than two hours.

Earth type electric cars had never taken hold on Mars. They were cumbersome to get in and out of and no one ever needed the heater or air conditioner that they offered. The driving distances were so short that anyone that wanted private transportation just bought a six passenger golf cart. The golf carts would go 40 miles per hour and that was faster than anyone on Mars ever drove anyway. There were dealerships in Phoenix that sold several different brands of golf carts. They also sold electric bicycles and tricycles, which were very popular for personal transportation.

The daily workouts at the gym were a drag, everyone hated and dreaded them. Still they feared the consequences of not working out more. One thing that could be said for the workouts was that the population of Mars was fit. There just weren't any obese people to be found on the planet. The people did get some relief though, The daily vitamins and the monthly shots were no longer required. The vitamins and medication that they had been receiving was now available from the atmosphere. Just the act of breathing provided a person, and perhaps even more importantly the animals with all their required nutrients and medications. In fact the atmosphere program proved so effective that the requirement for one hours exercise per day had been officially reduced to one half hour four days per week. A few people kept up with one hour per day because they were so accustomed to it but most cut back to the new minimum.

Little progress had been made converting the atmosphere on the surface of Mars. A new hearty plant that could resist the intense UV rays, had been developed that was super efficient at photosynthesis, converting CO₂ glucose and oxygen. They had figured out how to plant in a saturated mulch rich in nitrates that supplied water to the roots. The water had to be replaced annually. They had almost a million of these bushes now growing on the Mars surface. In order to make the atmosphere on the surface breathable they would need billions of them. There were over twenty full time gardeners that did nothing but tend these plants. It was a job that nobody wanted because you had to work full time in a Mars suit. As a result of just these plants they had noticed a one percent increase in oxygen a five percent increase in nitrogen and a six percent decrease in CO₂ in just five years. The best sign of improvement so far though is that an ozone layer is beginning to form and some of the UV rays are beginning to lessen. At that rate the atmosphere on the surface might be breathable in two hundred years without a Mars suit, or at least it wouldn't be

instantly lethal.

There was a belt that had been designed for use on Earth's moon that would completely encircle the moon and with the aid of counter balanced runners inside the belt begin to increase the spin of the planetoid. Tim didn't really understand how it would work but the scientists and engineers working on the project insisted that it would. The object was to get the moon spinning fast enough to retain an atmosphere. If that worked then they would try it on Mars. If Mars revolved a little faster, raising the gravity to 50% of Earth's then Mars would be able to sustain an atmosphere of Nitrogen and oxygen and the surface would become inhabitable. That however was, at best more than a hundred years off. It was a good plan but it never got off the drawing board.

CHAPTER – President of United States wants Utopia developed

September 10, 2124: The President of the United States had been wondering ever since he was in high school why they had never developed the Utopia cavern on Mars. He contacted the current Mars Council Chairman by email and asked about developing the huge cavern. The President of the council explained by return email that "Yes, Mr. President, we would love to develop Utopia but there are several reasons that we haven't. One we don't have the necessary generators to light it; we don't have the atmosphere equipment to pressurize it; we do not have the population pressure to require it.

The President discussed it with his cabinet and the senate and the house of representatives. Then he went public and discussed it with the press. Articles appeared on the internet and on TV. Suddenly there was a new interest in Mars. Polls were taken and Congress appropriated funds and it was decided that Utopia should be opened and developed.

September 17, 2124:: When Tim had all the details of the Presidents plan he called a special meeting of the Council. "As you know, ladies and gentlemen, for the past several years Mars has received little attention from Earth. The United States Government has now decided that the time would be right to open up the Utopia cavern. They are committed to sending us the necessary equipment to handle that huge cavern along with twelve thousand new settlers. All four of the Arton ships are coming home from Arton now and there is no demand on Arton at the present time for more settlers or anything else from Earth. They will need supplies by next year but for the next few months the Arton ships will be hauling all their cargo to Mars. I don't believe that we would need to develop Utopia in order to accommodate the people they are sending but I wouldn't want to look a gift horse in the mouth. All twelve thousand settlers will be arriving between November of 2124 and March of 2125. We need to prepare to absorb all of them within a five month period.

The first thing we will need is a reception center for temporary housing.

We will need to set up kitchen and dining room facilities to feed that many people three times a day and we will need adequate rest room facilities. We should have a well stocked supply room in order to provide them with phones, radios, air mattresses, blankets and personal necessities. Since we anticipate that the first 3,000 of them could be arriving within 45 days we will need to start getting ready for them now. If there are any businesses that have been holding off expansion because of a shortage of employees this might be a good time for them to expand.”

Perhaps the Council could take over the project of locating jobs for these people or create public jobs for them. Mars Colony, Inc. will be able to hire a lot of them working on the development of Utopia.

The list of necessary hardware was obtained from Mars then assembled on Earth and loaded onto the Arton ships as they returned from Arton and Mars. Arton Four was already in Earth orbit so it was loaded first.

October 17, 2124: Arton Two returned from Arton with five passengers and several thousand Artonian plants and made Earth orbit.

November 5, 2124: Arton Four departed Earth. In addition to the cargo of geothermal generators and atmosphere equipment they carried construction equipment, tunneling equipment and tons of miscellaneous items. Three thousand settlers were taken on board.

November 12, 2124: The Arton Four made Mars orbit. The six shuttles on Mars began removing the settlers the next day. In New Phoenix they were housed temporarily in the new reception center. These people had been transported to Mars at Government expense and had no contractual obligations to Mars Colony, Inc. as people in the past had when they arrived on Mars. Tim had a company hiring office set up near the entrance to the reception center and began signing people up the day after the first settlers arrived. Tim could not start on the project however until the cavern was sealed and pressurized and the new equipment was unloaded from the ships. Tim already had existing crews working on those jobs. The new employees received a \$25,000.00 signing bonus when they were signed to three year contracts so they could find or build a place to live. They continued to dine in the mess hall paid for jointly by The Company and the Council. The Martians were afraid that these new comers would not meet the same high standards as those that The Company had previously hired on Earth and transported up. They were pleasantly surprised to find that the Government had done a pretty good screening job and the ones that they had interviewed so far well screened before being selected.

November 27, 2124: Arton Two had been loaded with cargo of heavy equipment and raw materials for the development of Utopia. Three thousand more settlers were brought on board on the 26th so the Arton Two left Earth for Mars the next day.

December 5, 2124: Arton One returned from Arton and made Earth orbit. The authorities on Mars had notified the President that a bottle neck had formed

in Mars orbit. They simply did not have enough shuttle to unload the A1 immediately. It had taken the shuttles ten days just to transport the passengers from Arton Four to Mars.

December 6, 2124: The Arton Two made Mars orbit. The Mars shuttles began transporting passengers to the Utility cavern before starting to unload cargo from Arton Four. The population of Mars had grown by over six thousand in the last thirty days. Mars was easily able to cope with this influx of people. The Company was still hiring all that wanted employment but The Company deferred to local businesses until they had met their recruitment goals. Once all the passengers from the Arton Two were in the reception center there were four thousand seven hundred people housed there.

January 10, 2125: Six additional shuttles were nearing completion or in testing in the U.S. These were earmarked for Mars and loaded on the A1 as cargo. Once the shuttles were loaded they noticed how much empty space remained in the hold of the A1 the ship was filled with another huge assortment of other machinery and equipment.

January 12, 2125: Three thousand more settlers were loaded on A1 and it departed the next day.

January 19, 2125: A1 made Mars orbit. Five Mars shuttles immediately began transporting settlers to the Utility Cavern. The sixth shuttle had developed major mechanical problems and would be out of service for an indefinite period. It turned out that the necessary part had to be sent from the U.S. It was then discovered that the six new shuttles were loaded before the other cargo and must be unloaded last.

February 7, 2125: Mars Runner makes Earth orbit.

February 16, 2125: Arton Three returns from Arton and makes Earth Orbit. The part necessary to repair the Mars shuttle was immediately loaded on the Arton Three along with all the other spare shuttle parts that the Government had on hand. An order was placed with the shuttle manufacturer for more spare parts to replace the stock from the Government warehouse that had been loaded on the Arton Three. An enormous amount of furniture, appliances and household goods were loaded on the Arton Three as their main cargo as Mars had complained that these items were now in critical short supply since the arrival of all the new settlers.

February 23, 2125: Three thousand settlers were loaded onto Arton Three which departed for Mars the next day.

February 28, 2125: Mars Runner is loaded with nothing but personal necessities, vitamins and clothing to sustain 13,200 settlers for a long period of time.

March 2, 2125: Arton Three makes Mars orbit. The four remaining Mars shuttles begin transporting settlers to the planet. Another of the Mars Shuttles had gone down for repairs and would be out of service until the new parts were

unloaded from the ship.

March 9, 2125: Mars Runner is loaded with 1,200 settlers and departs immediately for Mars. Cargo on the Arton Four had still to be unloaded. The ship had now been in Mars orbit since November 12, 2124 and had yet to be unloaded.

March 15, 2125: The parts necessary to repair the two shuttle that were in the shop had been unloaded from the Arton Three, the repairs had been completed and the two shuttles were back in service.

March 20, 2125: Priority had been given to unloading A1 because Mars needed those six additional shuttles. By April 1, 2125 the cargo had all been unloaded and transferred to the Utility cavern. Now the crews could commence getting the new shuttles into commission. Unloading of cargo from the A1 was completed.

April 3, 2125: With all twelve shuttles now in service it was estimated that it would still take over two months to unload the cargo remaining on the three Arton ships.

April 4, 2125: The A1 which had finished unloading broke Mars orbit and headed back to Earth. Shuttles had finished the unloading of the Arton Four and it was preparing to depart the next day.

April 5, 2125: Shuttles worked non stop since the disaster to finish unloading the Arton Four, which left immediately for Earth.

PART II

CHAPTER – The Nuclear holocaust

April 4, 2125: Nuclear war on earth! Their worst nightmare had come true on earth. Nuclear Holocaust, The Islamic militant nations of the middle east had hit Israel with three multi megaton nuclear devices. Israeli ships at sea had immediately retaliated with 112 nuclear devices of their own. Between the time that Israel was hit and the middle eastern nations were wiped off the map the Islamics had launched almost two hundred additional nukes toward every nation on Earth that they considered non believers. Immediately after the introduction of nukes, North Korea had launched thirty more nukes at China, Japan and South Korea. Japan, South Korea and China had all launched nukes at North Korea. Pakistan had launched nukes at India and India had launched nukes at Pakistan. All told there were over six hundred nukes detonated on Earth within two hours. When the war ended there were eleven billion people still alive on the Earth. They all had received, or would receive a lethal dose of radiation within the next thirty days as the winds carried the contamination throughout the atmosphere of the planet. All animals on Earth were suffering the same fate.

Because of superior missal defense systems there were no missals able to penetrate the United States. There were two suicide bombers carrying satchel nukes inside the continental U.S. One detonated his devise in front of 1300 Pennsylvania Avenue in Washington D.C. Within five minutes of the first missal hitting Israel. The other was detonated at the location of The United States Missal Defense manufacturing plant in Phoenix, Arizona a few minutes later. Two other suicide bombers were apprehended before they could detonate their devises, one in New York City and one at U.S. Missal Defense headquarters at Fort Collins, Colorado. There were two other suit case nukes detonated in North America, One took out Ottawa, Canada, the other Mexico City. Other than these satchel nukes the North American continent had been spared a direct hit.

April 14, 2125: The seventeen people on duty at the Green Valley nuclear power station had kept their wits about them. Because the team leader was a qualified nuclear physicist named Tom Eddy, he had taken readings every hour. He gathered the workers together and made an announcement, "You all know what has happened on Earth today. We were spared a direct hit but I don't know if spared is the right word. I know that you have all been watching the instruments and you know that the radiation level here at the plant is above normal. It has not reached the critical level yet but it soon will. I am afraid that there is nothing we can do about that, it is going to happen, there is nowhere to hide. Even in the safe room, if we all went in there and shut the door we would eventually run out of critical supplies. This entire planet is doomed. You have two choices. You can go home to be with your loved ones until the end, and that is what I recommend that you do. I have no one to go home to so I am going to remain here to safely shut this plant down. You may wonder, if what I have just told you is true then why bother? The reason is that in fifty to one hundred years this planet will have rejuvenated itself. All of humanity is not doomed, just those of us on Earth. There must be more than one hundred thousand human beings on Mars and Arton who will want to reclaim the Earth when it is safe for them to do so. When that day comes I would like for them to find this power station intact. If we just abandon the plant it will go to critical mass and add to the contamination which will prolong the day when mankind can return. I would appreciate it if one or two others of you who have nothing better to do with the last week of your lives would remain behind with me to help in this task. Another consideration is that we provide electrical energy to almost half a million people who are still alive. It would make their final days more comfortable if they continued to receive power. I plan to put on a radiation suit as soon as this conversation ends so I will be around long enough to provide them power until they have all succored then I intend to shut the plant down properly." Nine of the seventeen people either agreed to remain at the plant or to go gather their families and return. Tom asked one of those who were leaving to contact the local TV broadcasting station that had a manned antenna site nearby and have them contact as many of the other nuclear power plants as they possibly could and tell them what I have just told you. One of the women said, "I have children at home that I need to be with but

I will inform the TV station technicians of what you have just told us.” “I recorded this conversation Janie so all you will have to do is to deliver audio recording to them and make sure they listen to it. I will also play a copy of the recording over our power grid radio system and hope that the word gets out.

April 14, 2125: Shortly after departure from Mars The A1 heard on the radio the jumble of messages coming through from Earth. They elected to chance using warp one briefly within the solar system, something an Arton ship had never done before. Mars was presently at it's furthest point from Earth and the A1 wanted to get there as soon as possible. They kicked into Warp drive for thirty seven minutes. Once they came out of warp they barely had time to fire the retro rockets before making Earth orbit.

April 15, 2125: Tom Eddy had heard back from over one hundred of the more than five hundred nuclear plants in the United States and Canada. They had left messages for him saying that they had already decided on the same course of action that he had proposed or had decided to when they got his message.

April 16, 2125: Tom Eddy and his loyal crew shut down the plant safely then removed their radiation suits and willingly drank the deadly cocktail that they had prepared.

April 16, 2125: Humanity, on Earth ceased to exist.

CHAPTER – Mars welcomes the new arrivals

April 17, 2125: All together there were 13,452 human beings landed on Mars, this figure included the 1238 that they knew were on board Mars Runner which was en route. At that moment Mars had a population of 54,354. Almost 8,000 of these people were still refugees being housed in what was referred to as the reception center. The officers from the Arton ships said that there were another 45,000 or so settlers already on the surface of Arton. So the total population of the human race had been reduced to fewer than 100,000.

None of the officers or passengers from the ships had ever been on Mars. All they knew was that it was a mining colony with an observatory. The Arton crews knew that on occasion they had gone out of their way on their return voyages from Arton to load ore and other cargo but they had no idea what Mars was really like. The cargo they had picked up had been packaged and put into orbit before they got there. They just approached the orbiting cargo, brought it on board and departed immediately for Earth. Each group of new arrivals had at least one member of their group say, “I can't believe my eyes” when a fleet of open air buses picked them up in the Utility cavern and whisk them away to New Phoenix.

Keep in mind that these were people who had just lost their whole

families on Earth. Most of the adults on Mars had also lost their families on Earth but that was then and this was now. Tim and Hal and the new director of Government operations met with them at the State office building.

Tim introduced himself and said "I guess we all know what happened on Earth on April 4, so the question in everyone's mind is where do we go from here?" The space ship officers did not have a clue. They; did not have a basis to make a decision on, and they knew it. One of them ask Tim "Mr. Erkin, how many more people could Mars accommodate, are you overcrowded already." Tim responded, "Our present population is approximately 55,000. We could easily sustain another million people and remain self sufficient. Theoretically the planet could eventually sustain a population of three hundred million people, but only if all of the known caverns on the planet were fully developed. The present size of our developed caverns gives us the approximate land mass of 3056 square miles, our eventual land mas could be about equal to the size of the continental United States." "Do you have enough food for all those people?" another officer asked. "Certainly", Tim responded. " We have farms, ranches, orchards, wineries and herds of animals to more than sustain over one hundred thousand people now and 80% of our available land space is undeveloped. "Then why aren't there more people on Mars," another officer asked. "Because you guys keep hauling them to Arton," Tim answered. "I never dreamed," said the officer, "I just thought Mars colony was a few guys extracting oar on a dead planet."

Before we continue with this discussion I want you people to take a day and tour of Mars, or at least some of it, you can't possibly see it all in a day. That would be like trying to see all of Texas in a day. Most of us live here in New Phoenix. We don't have more cities because there is no need. We all have everything right here. Right next to New Phoenix is Utopia, it is an enormous cavern, larger than all of our other caverns combined. So far we have not developed Utopia but we now have everything we need to open Utopia. We have discovered pressurized and introduced atmosphere to several caverns larger than either of these large caverns that we occupy but they are just sitting vacant at the moment. Tell me, how many people are living on Arton and what are their living conditions? Tim asked" "Their highest ranking officer responded, there are a little over 45,000 humans scattered around the planet. The air is similar to Earths, the size of the planet is similar to Earth. The planet could eventually house five to seven billion people. There are large animals that you would think of as dinosaurs, in abundance, there are an estimated two hundred thousand humanoids, that have formed into tribes and dwell in caves much as humans did on Earth ten million years ago. Overall the land mass on the planet is a little larger than earth. There are no continents just islands. No matter where you are on the ocean you can see several islands. Just try and picture it as Earth was ten million years ago.

First see our planet but then as I see it our alternatives are to transport all of us to Arton or to transport all of the people on Arton to Mars or to have Mars continue to provide the things you were getting from Earth for you to

transport to Arton and for mankind to inhabit both planets so that a catastrophe like the one that destroyed the Earth Yesterday can never destroy mankind. I suspect that the cargo that you have been transporting to Arton Included a lot of weapons and we have no weapons on Mars, none. We could tool up and turn out weapons but we don't have any now. Also be aware that we will loose contact with Arton when you exhaust the energy supply in your ships. We do not use nuclear energy on Mars, we rely exclusively on geothermal energy. We have found uranium ore on the planet but we have never mined any because we don't need it and we don't want it. After what happened yesterday, I don't suppose we will ever want it. My next point is that we still have the Mars Runner that is capable of travel to Earth. In fact it is on it's way to Mars now loaded with cargo and settlers. It should arrive in Mars orbit around the middle of August. I am sure than in a few years we will want to send inspection teams to Earth to see how hot it is and to see if there are any people left alive anywhere.

“Just from the conversation we have just had I think I already know the plan we are all going to agree on,” said Tim. You should take the two ships that you have already provisioned and continue on to Arton. Tell them what happened on Earth and return to Mars with as many of them as want to return. That way those that remain on Arton given a hundred thousand years or so may come up with what man had on Earth at one time, hopefully it won't end the same way. I suspect that you in this room and your crews will prefer life on Mars, but the ones that went to Arton in the first place are the kind of people that are seeking thrills and high adventure. A lot of them will want to remain, and they should. Once you get back to Mars you will want to put your ships into a parking orbit around the planet and live your lives out here. That should be left up to each individual. Be sure when you travel to Arton that you have enough extra crewmen to handle your ship on your return. Only you people know how much fuel you have and how many more trips you can make but I suggest that you make none just in case your ability to fly is needed to travel from Mars to Earth and back on several occasions.” That evening all 14,000 guests were put up in the reception center. All were fed a hearty meal.

July 6, 2125: The newly arrived people all 14,000 of them were taken on Guided tours of Mars. They visited the ranch and saw all the animals, they visited the orchards and the farms and the vineyards and the city. They were taken to Paradise and shown the campgrounds and the rivers and lakes teeming with fish, they were shown some of the tamed but unused caverns, one larger than New Phoenix and Utopia combined. They toured the industrial complex and tasted the Martian wine and beer. They were shown the Ski Lodge. They had all been very interested in the tour and most of them realized by the end of the day that Mars was not only a better place to live than Arton, Mars was a better place to live than Earth had been a month ago, before they blew themselves up. After the tours were completed they were returned to the reception center.

July7, 2125: The ship's officers met with Tim around 0900. They

concurred with his plan of action. An announcement was issued that anyone on Mars who wanted to spend their lives on Arton should assemble at the Utility Cavern the next morning at 0600 to board one of the space cruisers. That went for the crews of the space ships as well. All other crew members were asked to stand by in the tunnel leading to the Utility Cavern so that if there were any crewmen that wanted to remain on Arton there would still be sufficient crew to return the ships to Mars.

July 8, 2125: 0600, there exactly twelve people standing in the Utility Cavern waiting to board a ship to Arton. All of the crew members from all four ships were in the tunnel. It seems that they all wanted to live their lives out on Mars, not Arton. All four vessels left port that morning. Two headed for Arton with the last load of supplies that would be delivered to the planet for some time to come. The other two headed for Earth and the Moon to rescue survivors.

July 9, 2125: The Mars Unified Counsel of Elected Representatives met to discuss the future of Mars. Particular attention was given to the problem of how to keep the economy of Mars from collapsing, resulting in chaos. After listening to some fifty speakers and hundreds of ideas the following consensus emerged and voted into law. The first Colonial bank had agreed to honor all existing accounts and to continue to credit those accounts with all regular deposits, such as wages. The bank would evaluate all stock and bond portfolios that the Citizens of Mars had on April 2, 2125 in Earth held securities and credit the accounts of those people with the appropriate amounts of cash, just as though they had they had sold their securities on that day. The price of gold on Earth on April 2, had been \$2,242.00 per ounce. The Gold in the vaults of the bank amounted to 2,186 metric tons. That gold was the property of Mars Colony, Inc. and would remain the property of Mars, Inc. Everyone had always known that diamonds and other precious stones had kept turning up in small quantities but no one had ever admitted it. It was just a kind of a bonus when someone found a stone. Most of those stones were now in Paul Silverman, safe at the jewelery store, but Paul had bought and paid for them so they were his and would remain so. Paul had readily agreed that all future diamond finds should be the property of Mars, Inc. and should be turned in to the company. Diamonds of course now had little value except that Mars was being put on a Gold and Diamond based economy. The value of Diamonds had arbitrarily been set at \$3,000.00 per carot which the bank agreed to credit to The Company account. Mars Unified Counsel of Elected Representatives authorized the bank to mint and put into circulation iron and nickel coins in the amounts of one, five, ten, twenty, fifty, one hundred, and one thousand dollar denominations. These would bear the inscription, pay to bearer on demand the value of this coin in gold. Everyone knew that in actuality, the gold and diamonds had no intrinsic value but just their universal acceptance bestowed on them their value. That public faith was enough to keep the economy running.

It was agreed that The Company structure would not change, The Company would henceforth be known as Mars, Inc. Corporation papers were

filed at the recording office of the Federal building noting this change and establishing a board of Directors listing Tim Erkin as Chairman and a dozen other company officers as members of the board of directors. They all, including Tim agreed to a fifty percent pay cut. In fact every employee of The Company was notified of a fifty percent pay cut. All employment contracts that employees had with The Company were canceled. No one would be laid off, The Company had many jobs to be done in their various enterprises. Including the ranch, the farms, the orchards and the manufacturing plants. The Company also was the owner of record of all the real property on Mars. Tim addressed the Counsel announced that The Company would form a real estate branch to sell off a lot of the property that The Company would identify and list for sale in coming months. Tim said that monopolies were, in his opinion not good for any economy and he wanted to see many of the companies employees strike out on their own and start private corporations and open small business establishment of all sorts.

As more jobs were created and more business and manufacturing started the number of people in the reception center began to dwindle. More homes were being constructed, schools built. Since Arizona had been opened tunneling crews had opened a dozen more smaller caverns that had been sealed and pressurized but were lying unused. One after another people began finding uses for them. Some for raising livestock, some for agriculture, some for industry. They still had their ace in the hole, Utopia, if more land was ever needed.

Ten years from now I would hope that Mars Inc. could be just another successful corporation on Mars and not necessarily even the largest corporation. Tim was a whole hearted believer in the free enterprise system and in a democratic form of government. Over the next two years there were fifty two small business opened on Mars. There were twenty six new corporations started. There was even an over the counter stock exchange being operated by Paul and his two employees. Since the disappearance of the Earth, Paul's Jewellery had little demand. Paul transitioned easily into running and controlling the Mars stock exchange. Prices were published daily on MARS-TV and on Mars.com. At first there were some wild fluctuations but eventually they leveled out and were the backbone of the young economy. After five years Mars Inc. was down to 1,800 employees but still owned and operated much of Mars. Tim had sold the lower half of the Hour Glass to the lessors, Austin, Byron and Glen, who now employed over two hundred people and were Incorporated. The bank was Incorporated on Mars and now had three branches and over one hundred employees. The Counsel had formed all sorts of new bureaucracies and employed over two hundred fifty civil servants. One thing that the counsel had done that nobody cared much for was that they had imposed a flat rate ten percent Income tax, a one percent property tax and a five percent sales tax. Like I said no one liked it much but they all knew that it had to be done. The Government had obligations to meet like everyone else and the money had to come from somewhere. On Mars as it had been on

Earth the money would have to come from taxes, permits, licenses fees and fines.

If anything the disappearance of the Earth had strengthened the economy of Mars and had broken the stranglehold that Mars Colony, Inc had on the planet. The Federal Government of the United States had been abolished and the employees terminated. In short order a new corporation of scientists had formed and Incorporated. They had more work than they could handle. All tunneling had been temporarily stopped until such time as population reassured created a demand for more land, which wouldn't be for many years. Some of the new companies were buying real estate from Mars Inc. that was located in undeveloped caverns. Many of the newly developed caverns were unique and they all had their own personalities. Tim had already decided to develop the largest of them to a long term timber project and had crews leveling the bottom of the cavern and readying the soil. Grow lights had already been installed that would be adequate to grow trees. Tim had also planned to plant wheat on the land and raise goats . There was plenty of water and they had already installed a new large generator and two atmosphere machines before the Earth had collapsed. Tim's plans had not changed with the loss of the earth. Seedlings had been planted and the young trees had thrived. By March of 2125 The trees were already the size of Christmas trees and goats were roaming the range. This was a 54 square mile monster cavern. Eventually, Tim supposed this land would have a higher and better purpose but for now it would make a great goats ranch and forest. Especially since the loss of Earth Mars would have to meet their own demand for timber.

CHAPTER – The rescue mission to Earth

April 5, 2125: The A1 immediately established radio communications with the Earth orbiter and the moon base. Various other manned satellites had been checking in with the Earth Orbiter and were told to send everyone there. The orbiter had no Shuttle on station when the bombs started going off so they could not pick up the survivors and have them all waiting in one place. One by one shuttle started showing up at the orbiter. Of the forty seven shuttle on Earth all but nine had managed to grab the nearest sixty people and head out to space. One by one the shuttles were able to discharge their passengers at the orbiter. The first shuttle to arrive at the orbiter went to gather the people working at the other satellites. By the time the A1 contacted the orbiter there were 2,454 survivors waiting for rescue. The A1 loaded the passengers from the orbiter and 20 shuttles that they had room for in their cargo hold. They were preparing to enter moon orbit when they were contacted by radio, It was the Arton Four that had just made Earth orbit.

“What is the situation here?” “Better put Captain Sorenson on, please get him and as many of the ships officers as are available, I only want to go

through this once.” “Captain Sorenson, this is Captain Davis, I have here with me Captain Allen from the Earth Orbiter I think Captain Allen should begin.” Captain Allen talked for better than an hour describing everything that had happened in the last thirty six hours, then he turned the mike back to Captain Davis. “Here is where we stand now, we have taken 2,454 survivors on board from the shuttles that escaped Earth when the shooting started, from all of the satellite stations and from the Earth Orbiter. We are now going to set an orbit around the Moon and launch enough shuttles to bring their one thousand one hundred sixty people on board. Once they are safe we will return to Mars. Our cargo hold is full with twenty shuttles. There are twenty more moored to the Earth Orbiter. I suggest that you continue to search Earth for survivors that have not been contaminated yet. I don't know how long you should do that but you will know when your job is done. You have a heartbreaking task because there are still at least five billion people alive on Earth that have received a lethal dose of radiation and there is nothing you can do for them. If you try to rescue them some of your people could become contaminated and the ones you were trying to rescue would be dead in a few days at the most. I suggest that for the first week to ten days that you not respond to calls for help. After that any calls you get could very well be from people that are in sealed environments that have not been contaminated. In the meantime you could gather what radiation suits you have and load them onto one of your shuttles. I am sending you the radiation suits that we have by shuttle, that should give you forty suits that could be lowered or dropped to any survivors that have not been exposed. If they are in a sealed environment I don't know how they would be able to reach the suits but maybe they will be able to work it out. Even a ten second exposure would probably be fatal so they might have to even sacrifice one of their own to get the suits. I just don't know. Once your job is done then pick up the remaining twenty shuttles at the Earth Orbiter before returning to Mars.” I don't see how we could improve on that plan, we will do what ever we can and just play it by ear. See you back on Mars, Arton Four out.”

The Moon Base was another story, They had their own Shuttle but preferred to wait it out on the Moon because they were fully stocked with supplies and could hold out longer there than they could at the orbiter. There was also the logistical problem of transporting 1160 people in one shuttle. The A1 received a radio message from Moon Base. “This is Admiral Johnson at Moon Base, what is your status?” “We are presently in Earth Orbit with 2,454 survivors on board from the Earth Orbiter. We are preparing to move to Moon Orbit to pick up the people on Moon Base. We should be there in about four hours.” “That is negative Arton One” We have just been hearing traffic from Barrow, Alaska. Contamination has not yet crossed the Arctic Circle. We know that everything south of there is contaminated. There are approximately eighteen thousand people North of the Arctic Circle who have not been contaminated. We are fine here on Moon Base. Suggest you return your 2454 survivors to Earth Orbiter with enough supplies to hold them over until you see

how many you can find in the Arctic Circle. We can accommodate five thousand people total on Moon Base. Where is Arton Two, Arton Three and Arton Four?" "Arton Four is presently in Earth Orbit, A1 and Arton Two are in Mars orbit unloading Cargo." "We will contact Mars and have them dispatch A and Arton Two immediately to Earth whether they have been unloaded or not." "Ten Four that, we will get Arton Four on the Horn and dispatch them to Barrow immediately. "This is Captain Barstow of The Earth Orbiter, Admiral. If The A1 sets off the 2,454 refugees from on board back on Earth Orbiter we could sustain for approximately ten days without additional supplies." "This is Captain Davis again Admiral. We broke a cardinal rule when we just made the trip from Mars to Earth. We used warp speed and got here from Mars within two hours. It can be done and now we know just how to do it, maybe not with utmost safety but using warp we could pick up five thousand of those eighteen thousand people in the Arctic, move half of them to Moon Base. Then reload the people from Earth Orbiter and take five thousand people to Mars then return and get the three thousand six hundred that you will have on Moon Base.

Captain Davis sent an officer to the com room immediately to notify the Arton Four to try the north polar region with shuttle as soon as possible. The Arton Four responded that they had already retrieved the shuttles from the Earth Orbiter because they did not have any on board. They would move to a North Polar orbit and launch shuttles within the next two hours. He then put an urgent message in to Mars. "There are apparently eighteen thousand people within the Arctic Circle that have not been contaminated. We need the Arton Two and Arton Three here immediately to take on Refugees." "Moon Base contacted us a over an hour Arton Two and Arton Three are already en route to the Arctic Circle using Warp speed. They could arrive any time."

April 6, 2125: "The A1 returned the 2,454 people on board, to the Earth Orbiter including Captain Barstow. A1 then topped off their supplies and headed for Barrow, Alaska.

The Arton Four launched all 20 shuttles to search all enclaves of mankind north of 50 degrees North latitude. Captain Sorenson told the pilots. "If you see anyone on the ground that needs help then fly south until you find the first clear area, land and take a reading, if the atmosphere is clean still then go back and pick them up, otherwise just leave them be. I know that sounds cold but if they are already walking dead men we can't help them." "Shuttle one to Arton Four I am taking a reading at 49 degrees North Latitude, the air is, I repeat, is contaminated." "Shuttle two to Arton Four, I am taking a reading at fifty five degrees North Latitude, the air is, I repeat, is contaminated." "Shuttle three to Arton Four, I am taking a reading at 62 degrees North Latitude, the air is, I repeat, is contaminated." "Well that lets out Anchorage and Fairbanks" Captain Sorenson said to no one in particular. "Shuttle four to Arton Four I am taking a reading from 66 degrees North Latitude, just inside the Arctic Circle, the air is not, I repeat, is not contaminated." "Shuttle five to Arton Four, I am taking a reading from Barrow, Alaska, 340 miles North of the Arctic Circle, the air is clean, I repeat, the air is clean. I see people on the ground, there must be

three thousand of them, send more shuttles.” “Captain Sorenson sent all nineteen remaining shuttles to Barrow and they began to evacuate refugees. Within four hours they had received five thousand people on board the Arton Four. The Arton One, Arton Two and Arton Three all responded. The Arton Two and Arton Three still had cargo on board but they could take on refugees. The Captains threw the safety book out the window and accelerated to Warp speed. The A1 made Earth Polar orbit in just under three hours. The Arton Two and Arton Three weren't far behind. The A1 immediately launched their 15 shuttles. Within six hours they had completed the evacuation of Barrow and some thirty seven Alaska villages. The radio room of the Arton Two picked up an SOS on a Navy frequency. Between the four ships they had rescued eighteen thousand people from the Arctic. They were all safely on board the ships within eight hours of when the rescue of Barrow had begun and the air still tested clean. There were traces of radiation showing up but the atmosphere was still in the safe zone.

“SOS This is USS Patrick Hudson, does anybody copy. SOS” “Patrick Hudson this is USS Arton Two, we are in Arctic orbit around Earth. What is your location?” “We are just below the ice cap near the North Pole, at 69 degrees North Latitude, the air is not, I repeat, not contaminated.” over.” “Patrick Hudson, please proceed south until you find ice thin enough to break through. Then surface but keep the vessel sealed. We will spot you and pick you up once you have surfaced. How many of you are there?” “There are 92 in our crew, we were under the pole on maneuvers when things went bad.” “Arton Four launched the three Shuttle which headed for the North Pole and made radio contact. We have three Shuttle looking now they will be near your location in prox one hour. They should be able to spot you but they are on this radio connection now. Shuttle one to Patrick Hudson do you know the approximate coordinates where you will be able to surface?” “The skipper of the sub gave them a coordinates then said we will surface in prox one hour, just about the time you arrive.” “This is Shuttle One, we will get readings before you surface.” “This is Patrick Hudson, we are in place to surface, our exact coordinates is, and he gave the coordinates.” “Copy that, Patrick Hudson, our three Shuttle are approaching now, We are only getting a trace of radiation, You couldn't live in it for years but it won't hurt you to be exposed for a few minutes.” “Surface, surface surface.” Then the pilots saw the Ice mound and saw the Patrick Hudson. They maneuvered their so as to pull up within 50 feet of the sub. “Get your people out now and make a run for our shuttle. Send your people in three groups and have each group go to a different Shuttle .” “Roger that” The main hatch popped open and the 92 crew members made a beeline for the Shuttle's. Once inside the ships were sealed and took off. Little over an hour later they were docked beside the Arton Four and Air locks were secured. “The crew of the sub were the happiest people the crew of the Arton Four had ever seen. During debriefing they said they had picked up scattered radio traffic after the destruction but one by one over the next several days the radio chatter had stopped as the people had died of radiation poisoning. “The only people on the planet who could have survived would be people that were in sealed

chambers such as we were in the Patrick Hudson. "There may be other submarine crews but I doubt it. Once they surfaced anywhere on Earth anywhere other than where we surfaced they were exposed to a lethal dose of radiation, and were goners in a few days. We know that from the radio contacts that we had. Also most of the ocean is also polluted with radiation. It was working it's way North but hadn't reached us yet. If you hadn't come along when you did we would have been dead in two weeks, or less. Even the people in the Ant Arctic would have a lethal dose by now." "My question is what do we do now?" "We are returning to Mars, I think our work here is done." Two hours later the Arton Four pulled out of orbit and headed for Mars."

"Boy are we ever glad to see you guys, but now that you have rescued us where can you take us, Arton?" "Hardly, We, and you, I am afraid are going to have to live out our lives in those miserable caves on Mars." With that remark said the questions began to fly at Captain Sorenson from all the leaders from Barrow, the villages and the Patrick Hudson that had met in the dining room for the briefing that Captain Sorenson had requested. "Does the colony on Mars have room for us?" "Will they share their food with us?" "What will happen when they run out of food and there are no more supply ships coming from earth?" "I would hate the thought of living out my life in a cramped little cave!" "Well I am afraid that is just going to have to be your fate" The answers to your other questions are "yes they will share their food with us, yes, they have enough room for us. The two Mars Supply ships were retired five years ago but Mars Runner still makes regular runs to Mars, they haul more people to Mars and Mars exports back to Earth. They also have been hauling luxury items to Mars on their way up. Things Martians have ordered off the internet and paid for. You will just have to wait and see your new home when you arrive on Mars."

It was agreed that the four ships should engage Warp Speed only briefly on the return to Mars, in the interest of Safety. The Arton One used warp longer than the other ships because they had to drop their people off on Mars and then return for the people stranded on the Earth Orbiter and Moon Base.

April 8, 2125: "A1to Mars comm we are entering Mars orbit with five thousand refugees. We need to transport these people as quickly as possible because there are another three thousand six hundred people stranded on the Earth Orbiter and Moon Base." By the time that The A1settled into Mars orbit there were seventeen shuttles waiting to off load refugees. Eight hours later The A1was headed back to Earth once again they used Warp Speed briefly.

April 9, 2125: The A1made Earth orbit and took on the refugees from the Earth Orbiter. They then established Moon orbit, dispatched their 15 shuttle and took on the refugees from Moon Base. A team of six people remained behind to maintain Moon Base knowing full well that it might be a long time before another ship from Mars would return.

April 15, 2125: The A1made Mars orbit. Mars sent up shuttles to offload refugees. By the end of that day the population of Mars stood at just over

80,000 people, almost 22,000 of them were housed in the reception center. The people of Mars that had room in their homes were urged to take refugees from the reception center into their homes. The reception center just could not accommodate 22,000 people.

July 24, 2125: Mars Comm sent and received messages frequently to and from Moon Base, if for no other reason to keep the skeleton crew on Moon Base from feeling detached from humanity. The Inuit Eskimo people from the Arctic blended in well with the population of Mars. Almost all of them spoke English, the few that didn't were mostly elderly and became home makers for their families, which was pretty much the role that they had played in their Arctic villages. Despite the authorities desire that everyone speak only English they were occasionally irritated by occasionally hearing people conversing in the Inuit language.

It amazed everyone how quickly the vibrant young economy of Mars absorbed the newcomers. Within less than a year there was full employment on Mars. Tim had once again decided not to develop Utopia. The equipment that Mars had recently received for that purpose was put to other uses in the development of more of the small caverns that had been discovered.

CHAPTER – Mars Runner returns to Mars

August one 2125: Mars Runner docks at Mars orbiter 1,238 passengers and crew were transferred to the planet by the Mars shuttles where they were provided temporary accommodations in the reception center.

The seventeen operating shuttles then made short work of transporting the cargo to the planet. Three people remained on board to maintain the ship and the orbiter. They would be rotated once a month. There still remained the 15 shuttles on The A1 and 20 shuttles on the Arton Four, that no one knew what to do with. It was finally decided to leave five shuttles on each ship and dismantle the remaining 15 shuttles for spare parts.

September 14, 2125: The reception center was closed down. Everyone had found gainful employment and made other housing arrangements.

CHAPTER – Immigrants from Arton

May 12, 2126: Arton Four enters Mars orbit with 1,261 passengers and crew who were transferred to the planet. Five crew members remained on board to maintain the ship.

June 14, 2126: Arton Three enters Mars orbit with 1,284 passengers and crew who were transferred to the planet. Again Five crew members remained

on board to maintain the ship.

June 14, 2126: The total population of the Human race was estimated to be 136,000 people. With roughly 54,000 of them living on Arton and 82,000 thousand on Mars. It had been resolved to send one of the Arton ships back to Arton, because they had powerful radios on board that could communicate with each other even at a distance of four and a half light years. Once a month Arton Four would send the news from Mars to Arton and once a month the Arton three would send news from Arton to Mars. Arton Four would remain in a parking orbit around Arton and become in fact a orbiter. They would have seven Shuttle They would be manned by volunteers from Mars who would be selected from the general population and agree to live their lives out on Arton. The word went out and barely enough volunteers consented to go. Over the next two months these people were trained to do the jobs that the crew of an Arton ship had performed. The ship was not loaded with any cargo because Arton was already a self sufficient planet. They would have their work cut out for them in learning to produce for themselves all the things that had formerly been shipped to them from Earth but there was no doubt that they would survive and prosper over the coming centuries.

CHAPTER – Earth Recovers

August 21, 2126: Arton Three departed for Arton, not to return to Mars for many years. The four remaining ships in orbit around Mars would remain there until Earth was once again habitable, except that one of them would be dispatched to Earth every ten years to gather data. This always coincided with Mars closest position to Earth's orbit.

March 7, 2136: It had been ten years since the destruction on Earth. Mars had prospered and the population had grown to over 125,000 souls. It was time to dispatch Mars Runner to determine the status of Earth. Mars Runner departed amongst much fan fare with only the crew and a couple dozen scientists aboard and a cargo of food and other supplies for Moon Base. Mars Runner carried four Shuttle in their hold.

July 19, 2136: Mars Runner carried seven volunteers who agreed to remain on Moon Base for the next ten years, it just seemed like such a shame to abandon one of mankind's greatest achievements. Upon their arrival Captain Lomax accompanied the volunteers to Moon Base for a look around the facility. Mars Runner had brought along enough supplies to keep the crew in food, water, atmosphere and other necessities of life for another ten years. The seven people who had been on Moon Base for the last ten years were ready to leave. These people had been in radio communication with Mars for their entire stay and had nothing new to report. Actually over the last ten years they had

nothing new to report. They still constantly monitored all radio frequencies but had heard nothing worth investigating for the last nine years and eleven months.

July 22, 2136: Mars Runner secured orbit around Earth and even docked at the long deserted Earth Orbiter. The place seemed no worse for the wear and the crew soon had it back in full operation. The four Shuttles were unloaded and had also docked at the Earth Orbiter.

July 24, 2136: The Shuttle flew their first sorties close to earth. Mars Runner had been monitoring all radio frequencies since their arrival and had found nothing. The Shuttle had flown low over the United States looking for signs of habitation but had seen nothing encouraging. One of them had landed at what used to be, Edwards Air force base in the California, Mojave Desert. They got out of their craft cloaked in radiation suits and took several readings of the soil and the atmosphere. There was good news, the air was breathable and though there was still a lot of radiation it was below the lethal level. Anyone living in this environment could live but would be very susceptible to developing cancer and other diseases. I would not recommend long exposure to this part of the planet. They got the same result from checking out various other parts of the planet and the only life form they encountered were some red ants in what used to be Kenya. On a hunch they tried the top of Mt. McKinley in Alaska. It was clean down to the 6,000 foot level. No radiation reading at all.

There were plants and trees still growing in abundance. They had seen what might have been a flock of birds from a distance but when they got closer they found only leaves blowing around. They then checked the Ocean at several locations, There was still some sea life but not much. The deeper they took readings the more sea life they found. Before leaving Earth they visited a number of locations on Earth to take additional readings. In Juneau, Alaska, they came across a huge quantity of cut lumber that tested clean because it had been wrapped in plastic when the catastrophe had occurred. They filled the hold of their ship with the lumber. Their trip would not be a total wasted effort. There was always need for wood on Mars.

November 23, 2136: The ship made Mars Orbit with a mixed message. The good news was that Earth was not a dead planet, trees some plants, red ants and some deep sea life were adapting. They had found at least one place on Earth that was now completely free of radiation, the top of Mt. McKinley above 6,000 feet and they suspected that all locations above 6,000 feet in elevation were also free of radiation. Those places were still not habitable because winds kept blowing in contaminated air. The atmosphere was no longer instantly lethal. The bad news was that they had found no people at all or any signs of people since the catastrophe.

July 24, 2146: This time A1 made the trip to Earth. They rotated the crews at Moon Base and resupplied the facility. Things were looking up. The atmosphere was breathable in most locations although there were still some hot spots. At elevations above three thousand feet they found no contamination of

soil or rocks. They still found no signs of human life. They observed several varieties of insects, life in the Oceans could be found in water as shallow as one hundred feet. In the Amazon basin they cut some choice hardwood and just loaded the logs onto the ship. Wood was still the most precious commodity on Mars even though they had been harvesting some softwoods grown on Mars for several years. Most of the Mars harvest had been chipped up and used to manufacture press board. The A1 carried no surplus food on this trip. Their conclusion was that Earth was beginning to recover.

July 24, 2156: The Arton Two made the trip to Earth, In most respects the planet was as it had been before the catastrophe. They really had to look to find any signs of the nuclear Holocaust other than abandoned buildings and visible signs of destruction. The air was good to breathe and the only hot spots that they found were at ground zero where the bombs had detonated. There was still trace contamination in the atmosphere but not near so much as there had been ten years earlier.

November 23, 2166: Tim was 74 years old when Arton Two returned from Earth with more hardwood. Carla had passed on the year before, their four children were in mid life and there grandchildren were either in college or out on their own. Tim had retired from company service in 2158 and now just puttered around the house. Tim had spent the bulk of his personal wealth in assisting the refugees from Earth when they were brought to Mars 40 years earlier.

Tim's oldest grandson, Josh had been on the crew of the Arton Two when it traveled to earth. He visited his grandfather and told him that Earth had passed it's physical. It was once again a safe habitat for humanity. Tim just grunted and went on tending his flower bed. "That means that man can return to Earth, grandpa. " "Perhaps you should introduce a resolution before the Council Josh, propose the colonization of Earth and see if you can find any volunteers. There are always young people looking for adventure in far away lands, that would be willing to sign up. If that happened it would give mankind the advantage of being present on at least three planets and we as a species would still survive if something happened to any two of them. Arton now has near one million population and Mars has over half a million. I suppose we could find a hundred thousand or so that would be willing to establish an Earth colony.

CHAPTER – Reclaiming Earth

April 24, 2167: Mars Runner, loaded to the gills with cargo and passengers, leave Mars Orbit, destination Earth.

July 25, 2167: The A1 is loaded with cargo and passengers from Mars

and departs for Earth. Five days later The Arton Four departs.

August 1, 2167: The Arton Two is loaded and departs Mars for Earth. The A1 Makes Moon orbit. They rotated the staff at Moon Base and replenish their supplies.

August 5, 2167 : A1 and Arton Two make Earth orbit and begin to offload passengers.

August 7, 2167: Mars Runner and the Arton Four make Earth orbit and begin offloading passengers.

It took them nearly a month for the seven Shuttle that they had brought along to offload their cargo of 10,222 humans, six thousand assorted farm animals, one million fresh water fish, 500,000 salt water fish and five million Earth worms to their chosen location. The new colony would be located at a place formerly known as Mission Bay, San Diego, California. The 1822 human beings all worked for the company, Earth Colony, Inc. The Company manager on Earth was Josh Erkin.

Somehow San Diego had been spared a direct hit during the brief war that had ended life on earth. In the intervening 42 years the corpses of all living beings that were on Earth had just disintegrated. At the very worst there were harmless piles of dust that had to be swept up and disposed of. Various metal objects that people had on their person were sometimes found in the little piles of dust.

The ocean water was once again clear of any contamination. One of the first orders of business was to close off a lagoon at Mission Bay and release the salt water fish that they had brought from Mars. There were several pristine little lakes and reservoirs to receive the fresh water fish. A crew of seven people was formed to make fish food and care for the fish.

As it turned out life on Earth had not been completely destroyed. Many of the lower life forms in the ocean had adapted or survived in their original form. Bacteria, algae, single celled creatures of the ocean had not only survived but had prospered. These creatures were at the bottom end of the food chain. With all the sea creatures that had fed on them gone they had multiplied with gusto. The colony found that they did not have to feed the salt water fish. The colony had their choice of any number of Yachts and commercial vessels that had not fared too badly and could be restored.

September 10, 2167 : The nuclear facility at Green Valley that Tom Eddy had left for them was found intact. Technicians from the ships who had been taught to tend the nuclear power plants in the ships were brought in to see if they could get the plant into operation. Tom had even left instructions as to how to reactivate the facility in anticipation of this day.

An Ariel reconnaissance of other nuclear power plants in the Western United States had revealed that more than one hundred of them had been shut down properly. a supply of Nuclear fuel that had been waiting for instillation and

had not gone to critical mass. The protective containers were still intact and the fuel rods they contained were still in their new condition. Electric Helicopters were plentiful but none of them had usable batteries. New batteries from Mars were installed in a few of them. The new batteries did not fit but once the holders had been modified the batteries worked. Some old museum relics of air planes, helicopters, heavy equipment and automobiles that ran on gasoline were found. A refinery in Southern Nevada was found intact which still had a huge amount of crude oil in tanks. Operation Manuals were also found there and intact. A crew of fifty had the refinery in production within a month and were producing gasoline and diesel fuel. The old choppers, aircraft and heavy equipment from the museum were brought back to operating condition and used to fill the gap until batteries could be manufactured on Earth once more.

Near the Southern Nevada refinery stood Hoover Dam, still intact. Lake Mead was full and overflowing over the top of the dam. They sent a crew down that figured out how to open the spillways and drain off a lot of the water from the lake into the Colorado River. The river flowed all the way to Yuma, Arizona and then spilled off into Northern Mexico. In the process they had succeeded in restoring the water supply to The farms in the Imperial Valley. That gave them all the room and water they needed for growing crops. Crews harvested some of the fresh water fish that they had seeded around San Diego and restocked Lake Mead. Someday they would send in crews to get the hydro-electric generators functioning once again.

They established giant compost piles which they were able to fertilize and bring the top soil back to life. Most of the plants on Earth had survived so there was plenty of mulch. The bacteria had never completely died out. The colony never lasted long as a colony, they were spreading out all over the west wherever they found the facilities that they needed intact. One thing that was still in critical short supply was The Lithium Ion Gel batteries that powered the machines of twenty second century man. Once a factory had been found that could be put back into operation, on a limited basis they were able to abandon the refinery and return the gasoline and diesel powered relics to the museum.

Once the Nuclear power plant was on line the technicians from the ships started seeking out a production facility that produced the Nuclear rods from Uranium that would be needed, not only to replace those in the power plant when they had become spent but more importantly to replace the nearly spent nuclear rods in the space craft. The facility they sought was soon located and nuclear fuel was being manufactured.

November 18, 2174: Once the ships had received new fuel the three Arton Ships departed from Earth orbit within a week of one another. It was decided that the Arton Four would stop briefly on Mars for supplies then proceed on to Arton. The Arton Four carried enough Nuclear fuel in safe containers to get the Arton Three refueled and back into service. They knew that the Arton Three was low on power when it left for Arton the last time. Everyone knew that it would never be able to return once it was there. Oh

perhaps if a nuclear fuel source was eventually developed on Arton new fuel could be manufactured but that wouldn't be a realistic hope for many years. The other two ships were to be put into service moving people from Mars to Earth.

The Earth was firmly established and well on its way to recovery. Because of the Nuclear complications the space ships had remained in Earth Orbit for almost two years. The Earth orbiter was back in operation. Mars Runner was permanently docked at the Orbiter because the Arton ships didn't require the services of an Orbiter. They could just open their cargo holds and take the Shuttle right on board.

Over the next two years The A1 and Two moved over four hundred thousand people from Mars to Earth leaving Mars with only a skeleton population but Mars remained self sustaining. Mars was just, once again to restructure their economy. They would always maintain a colony on Mars

Most of the people who had recently arrived on Earth were not returning to Earth because they had been born and raised on Mars. Earth was a whole new experience for them. The classes that Tim and Carla had taken when they were migrating to Mars were given in reverse, teaching Martians what they needed to know to survive on Earth.

These people found the gravity on Earth oppressive. It took many of them up to a year to get accustomed to moving around in such heavy gravity. Some adjusted quickly to Earth gravity, there was just no telling who would and who would not.

Along with the passengers most of the Zoo population from Mars was also returned to Earth and housed in the San Diego Zoo, the largest Zoo on Earth. The Zoo keepers were transported with the Animals and immediately commenced an accelerated breeding program in San Diego. They even brought some bees but not the ants and flies. Unfortunately the flies showed up on Earth anyway and the ants had never become extinct on Earth. The flies seemed to like the San Diego Zoo.

Some of the animals that had never been domesticated were soon being released back into the wild where, not encountering any natural predators rapidly proliferated. There were even eight American Bison which were released in South Dakota. Several of the Eskimo's wanted to visit the Arctic but once seeing the place wondered how their ancestors could have lived in such a place. They enjoyed seeing their native homeland but soon wanted to return to San Diego. Domestic Animals also rapidly proliferated and soon the people of Earth had all the products that they needed that could be produced from domestic farm animals.

One of the mathematicians calculated that it would take the Earth fifty thousand years to fully recover and even then it would be a vastly different Earth. There would be only one race and one language. Most species that had shared the Earth with man were now extinct. The only animals that would ever

populate the Earth again would be only those that were no threat to man.

Five years after man's return to Earth an expedition sent to explore Southeast Alaska made a remarkable find, it was one of those things that could never be explained. Salmon were spawning in several of the rivers, not many of them, and comparison of these Salmon with what existed before revealed that there were subtle differences but they were Salmon, none the less. This discovery spanned a more thorough investigation of sea shores and off shore waters world wide. There was one startling discovery after another. The conclusion they finally came to was that the Oceans of the Earth were recovering everywhere they looked. Not all species had survived but most of them had. Where conditions had traditionally been ideal for shrimp they found shrimp. Where conditions were ideal for Lobster they found lobster. Coral reefs that had completely died after the Holocaust were growing. Sea weed was abundant. The Oceans of the planet would eventually return to normal. Without pollutants being dumped into the oceans by man the Oceans would eventually return to the state they were in when Columbus Discovered America. For several years after these discoveries they continued to harvest the fish that they had pinned up in Mission Bay but eventually the harbor was reopened and the remaining fish could come and go as they pleased. Fishing boats once again trolled the offshore waters harvesting sea food. Salmon hatcheries were established in a number of Northwest locations.

On land they were also discovering species that had survived. None of the large animals had made it but they had found bats and some insects. Unfortunately mosquitoes were among the survivors.

Back on Mars there were fewer than fifty thousand people remaining, most of them elderly. Enough young people remained to sustain viability of the planet.

CHAPTER – The Two Ships Arrive on Arton

May 1, 2175: A little less than six months after departing Earth Orbit the Arton One and Two Space craft made Arton Orbit. The Arton Four had successfully refueled the Arton Three.

The crews of the Arton ships were very pleased to find out that not only had Arton survived for the last fifty years but the respect for the Arton Three that the people on the planet showed. They had accepted that the Arton Three did not have enough fuel to ever return to Mars or Earth. They still held hope that someday they would have the capacity to manufacture the fuel on the planet to refuel the ship. The crew that had flown the Arton Three had long since retired and most of them were now dead. They had the wisdom to train replacements from the youth of Arton. That crew in turn had trained their replacements. The

Arton Three was still fully staffed and capable of space travel even though one whole generation of crew members had never got out of planetary orbit. The other Arton ships had also replaced their crew members in the same way but the young crews on the other three ships had made several space voyages and considered themselves seasoned veterans. The fleet commander shuffled the crews of the four ships so that an equal number of seasoned veterans would be on each ship. Since refueling of the Arton Three had been accomplished, all four ships were declared sea worthy. The ships reduced to skeleton crews and took turns visiting touring and learning about Arton for the next four months.

CHAPTER – Settler's View of Artonians

A copy of the following document was distributed to all crew members before they went to the planet surface of Arton.

“UPDATED INFORMATION ON ARTON”

May 2, 2175

By Rosy Kurtis, Settler

The last that Mars had heard was that the colonists on Arton had encountered an indigenous population of humans that were similar to Neanderthals who lived on Earth from 300,000 years ago to about 30,000 years ago. It was since learned that the Artonian development was much further advanced than first thought. The culture was at first evaluated by identifying markers common to early man. The civilization on Arton had not developed agriculture, did not hunt animals collectively, lived in caves, had the slightly bent forward stance of Neanderthals, with knuckles that almost reached the ground. They did not use fire. Thus they were classified as early to middle Paleolithic man.

Subsequent contact and interaction with these people proved the earlier classification to be dead wrong. As it turned out they were different from early man and couldn't be put into the same mold. They had developed agriculture but did not practice farming except on certain Islands that did not have enough natural food. They did not hunt animals because they were vegetarians. They lived in caves because the caves were cool during the day and warm at night. They had the appearance of Neanderthals because that is the way they had developed. They did not cook their food because it had never occurred to them to do so. They preferred their food raw. They were capable of making small fires in the caves if they got a little chilly at night. They did go at least 40 feet from the cave entrance to expel their waste. On the inner islands they had developed a complicated board game that was similar to chess and were very good at it. I took our smartest people several months to win a game from one of them. These people were not war like, they were very friendly and hospitable. They welcomed strangers and were interested in learning about

them. They had a spoken language that everyone on the planet seemed to speak, no matter where on the planet they lived. They went around nude because they liked to and because they had a warm fur coat that nature had given them. There was a written form of their language that used an alphabet of 24 letters or symbols but only their scholars and elders who lived on the inner could read and write. This is about where man was in the tenth century AD. These people had a profound sense of humor, they loved practical jokes if there was no serious or dangerous consequence and they could sit around and tell each other jokes and laugh by the hour. We later discovered that a typical adult knew the the same 10,000, or so jokes, that all the others knew and they would tell the same jokes to each other over and over. The object of an Artonian joke is not in the punch line but the telling. They were in a sense relating short stories that everyone liked.

Because there were few motivations to improve they didn't bother. They were patently lazy. Even though there were many hallucinogens available on the planet there were age old taboos against ingesting them. An Artonian had rather die than to get stoned, it was part of their culture. They had a concept of God but no concept of the devil. They had a concept of heaven but no concept of hell. They appreciated art but only their scholars ever created any. They had never had a reason to compete physically with others because, I guess there was plenty of everything to go around. They had doctors who they sought out when they needed them. The doctors were skilled in herbal medicine and were quite good at it. Many of these people have learned English but few of our people have learned to speak Igaghu, their language. When we first made contact their names were Incomprehensible to us but now they come easily.

They are intensely interested in everything we do, they are little pests, they will stay with one worker all day and ask him as many as a hundred questions in eight hours. Sometimes they ask the same question several times, it is as though they all have Alzheimer's. In their case it is just faulty memory. They can remember their language and where they live and who their friends and relatives are and what they need to know to stay alive but to try and teach them something you are just wasting your time. They did learn and retain our language because they were motivated. They remember their jokes because they are motivated but when you try and teach one a skill his mind wanders and he pays little attention to what you are telling him because he sees no practical application as to how it relates to things he needs to know.

He may ask a workman "Why did you turn that valve" If the workman explains that he did it to let some of the gas in this cylinder, enter that system over there, the native will look very enlightened and nod his understanding. When the system has been pressurized the native will ask again why the workman turned the valve and the workman explains that the system I am working on has been pressurized so I am shutting the valve. Once again the look of intelligent comprehension comes over his face and he nods his understanding of what he has just witnessed. If he follows the workman who takes the same tank to an identical system and turns the valve again the native

will ask the same questions that he asked when the workman did the same job five minutes before. Natives are curious about why you do something but if it has no direct consequence on their lives they intentionally forget it immediately. On the other hand if you were spreading peanut butter and jelly on a piece of bread and you placed another piece of bread on top of it, forming a sandwich he would ask you what you were doing. If you ate the sandwich and decided to make yourself another sandwich just like the first one he would ask you the same questions again. If you were to give him half of the first sandwich and he did not like it he would throw his half away. Then if you made yourself another sandwich like the first one he would ask the same questions again. If he liked the half that you gave him of the first sandwich he would remember where you got the bread from, where you got the peanut butter from, where you got the jelly from and not have to ask you again about peanut butter and jelly sandwiches. If you left him alone in the room and went outside to do a minor chore then returned to the room you would see that he had the three items necessary to construct the sandwich with on the table, had made himself a sandwich and was happily munching down on it. If he came into your house a year later, he might very well go to where you kept the ingredients and make himself another sandwich and offer you half of it.

If one of them is eating a piece of fruit and another asks him for it he gives it to the person that asks for it and goes to the nearest tree and picks himself another. They have no monetary system because they see no immediate benefit to having money. Everything they need in their lives is abundant and free.

They love to watch each other make love. That is one of their favorite pastimes. They are not monogamous, they have no concept of fatherhood and no word for father. They are aware that sexual relations between a man and a woman produce children but they are never interested in who the father is. If a male is particularly fond of a certain female he is more likely to recommend her to his friends than he is to try to keep her for himself. Native men are with women like they are with everything else, they just have no sense of ownership of anything.

We just accept them the way they are, they are very amusing to watch and to hold conversations with. They are pests and nuisances but they are so friendly and adorable that you can't get mad at one of them. First off they wouldn't grasp the concept of getting mad. You can close the door to your home and lock it but if they want to come and visit you they will try and find another way into your house and if they can't they will stand and knock on your door for hours at a time. If their hands get sore they will pick up a stick or a rock or anything handy and beat on your door with that until you let them in. If there is no one home they never try to enter, they won't even try your door because somehow they know you are not at home, but pity the poor householder who is at home and does not let the native in, he will just keep knocking until your door gives way. When they come for a visit they may want to stay for two minutes or two weeks. When they tire of being there and want to

leave they just abruptly get up and walk out. They have no concept of hello or good by. There are no words in their language to express those concepts.

Some of our people have moved to Islands where there are no natives to get away from them. The natives fear the oceans so it has never occurred to one of them to build a boat. When boats operated by Earth people who live on an island where there no natives visit an Island that does have natives they thoroughly inspect the vessel before casting off to make sure there are no natives on board.

Our original reports mentioned the presence of dinosaurs, that report was only accurate to a degree. There are animals here that look like all the pictures of dinosaurs that we have seen in books but these are quite different. For one thing the largest dinosaur I have ever seen was about the size of a horse. Most of them are closer to the size of dogs. Actually when you think about it the only difference between a dinosaur on Earth and a horned toad is its size. These dinosaurs on Arton are all vegetarians, in fact we have never encountered a carnivore on Arton. Nothing on this planet eats anything else on this planet. All of the inhabitants eat fruits, nuts, vegetables and plants. The growth here is as profuse as it is in the Amazon Basin, only here on Arton everything is eatable. Nothing is poisonous. The only kinds of animals that we have encountered here are the dinosaurs. They will come if you call them, the little ones would make good house pets because they are so friendly. They are smart but if you teach one of them a trick he will do it for you again for maybe the next hour but the next day you would have to teach him the trick all over again. If they encounter one of our work crews they will just graze nearby and watch what we are doing for as long as we remain. When we leave they will sometimes follow us home and sometimes just wander off in some other direction. There are fresh water pools lakes and streams all over the islands. The weather is about perfect.

This is really more like the garden of Eden than it is like the Amazon Basin. The most popular vacation on Arton is to just go native for a while. There are no continents as we know them. The entire planet is covered by water and dotted with islands. The natives don't like salt water because in the salt water there are carnivores. Quite a variety of them. On a few Islands there are the upper class the people with a better education. The Islands that they live on have buildings and some of the citizens dabble in the arts and in a limited amount of science. Their science is about up to where man's scientific knowledge was at the time of Christ. They have discovered the wheel and domesticated a few dinosaurs to pull their carts. They have named the closest stars that they can see with the naked eye. They have built boats and learned to navigate their boats that are propelled by sails. They have even melted down gold and made a few coins, not for circulation as money but as cooperatives of important events and to honor their past leaders.

Artonian natives have an interesting way of disposing of their dead. They wait for low tide then they drag the deceased out to the low tide mark and

wait the body down with rocks. When tide comes in and then recedes again the body is gone. They don't grieve for their dead the same way humans do. They just accept the death as a part of life. They hold a simplistic view of the hereafter and they do believe in reincarnation. So in their view the deceased person has not died he has just moved on to his new body.

We have made an effort to educate these people but with only limited success. Down deep they have the same personal characteristics as the fools that live on the other islands. If one of their people is trying to solve a particular problem when you happen on to him and you show him the solution he will remember that solution and apply it the next time that he faces that same problem. If you sit him down in a class room and try to teach him the solution to other problems he will lose interest and walk out.

One time I went to a boat yard where some men were building a boat. When I showed one of them a better way to do a certain task he was courteous and interested and told me that he understood what I had told him and he sure appreciated learning a better way. When he came to the same task a few minutes later he did it the same way he had always done it. What I had taught him just didn't register. If he was faced with a problem he couldn't solve and you showed him how to solve it he would remember what you taught him and he would do it that way from then on. So much for their elite people.

The problem with this planet is that once the new wears off there is nothing to do. You can't really improve it. You don't need to tame the animals, you can't teach them much. The people are really friendly but they are worthless. Food is plentiful but we have to conceal the fact that we are carnivores from the natives. They just wouldn't understand eating another animal. It would get them confused. On the Island where there are no natives we have farms where we raise cows and goats and the like for meat and dairy products but on this Island we do not raise Earth animals or Earth plants. On the humans Island it is more like Earth We have an observatory that has done some really fascinating work. They have charted at least one hundred other planets worth exploration. The observatory however, has been closed down for the last 20 years.

We haven't had a shipment of anything from Earth in over fifty years so there are no stores and most of our money has just rotted away. We still have a few coins left but mostly we just use the barter system or help anyone that needs any help and give away anything we don't need. The way the economy works is that if you make cheese you give it away to anyone that wants it. If you make anything you just give it away. A lot of people just do nothing but people are always asking them to help with some task like building a fence or a barn or something. If asked they cheerfully lend a helping hand. When those freeloaders want something from someone who produces it the producers usually assign them a small task that they must do first before they get the product that they want. For example if a freeloader wants cheese the cheese maker will ask him to sweep out the office in exchange for the cheese. If the

freeloader were to refuse he would not get the cheese.

A lot of the people are just fed up with Arton. I think many of them would return to Earth if given the opportunity. It sounds exciting there now and I think most of us would like to be a part of that. My guess would be that 50% of the people would return to Earth if they could, the rest would perfectly content to remain here on Arton. If you did take some of these people back with you they would be of marginal value. They could not or would not do more than was required to survive.

There has been a feeling of apathy set in on the planet. We had local Government 40 years ago but then an election came along and nobody wanted to run for office so they devolved the government. If someone commits a crime they just give them a boat and tell him to find another island to live on. That has only happened a couple of times though. We built churches but people just lost interest and quit attending. All we have ever accomplished is cottage industry. If the people need wood to build something the women hound the men until they go out and cut down a few trees. There is a fifty year old saw mill where they can cut the trees into lumber but the logs usually just lay there for a few months before a crew gets together and fires up the mill. We have schools that run through the fifth grade but most kids don't attend regularly and their parents don't usually make them attend. Besides most of the time a teacher does not show up. If things continue like this in another two hundred years we will be living like the natives. The only thing that separates us from them now is that our women get pregnant easier. This planet could easily become overpopulated with humans. Our population keeps growing. We have examined several native women and found that they only ovulate about once a year so they have babies a lot less frequently than human women do. That is why the planet will never be overpopulated with natives. When one island gets overcrowded with humans a few of us just move on to the next island. Some islands have natives living on them and some do not. Everyone just picks an island to their choosing and lives there.

Many of us from Earth have become aware that there is something about this planet that changes the way you view things. It never had much effect on the ones of us who came here from Earth but the people who were born on Arton are more like the natives than they are like us. Some of us have blamed it on the atmosphere of the planet, some have speculated that there be something in the food but I have developed my own theory. That is that the living here is just too easy.

You wanted me to tell you about Arton that is about all there is to tell.

This document copied and distributed to all crew members courtesy of Arton Fleet Command since they do not have copy equipment or paper on Arton.

CHAPTER – Admiral Carter's Decision May 2175

Admiral Joe Carter was holding a staff meeting for the four ship captains and their executive officers. "Have you read this update gentlemen?" They all nodded that they had. "Not only have I read it but I have visited the planet and verified it. Considering this report I would like to propose a course of action. This course of action is based on the conclusions that I have reached from reading the report and seeing conditions for myself. We could take maybe eight thousand people to Earth and Earth could sure use more people." If we did that we would be cherry picking the youngest, the brightest and the best from this society on Arton. These are the very people that are needed here. After all this is the outpost of humanity. Arton may someday prove to be as important as Earth. As it turned out the best investment that mankind ever made was the investment we made in developing Mars. As it stands now Earth could use a couple hundred million people and Mars could even use a quarter million but both Mars and Earth are sustainable with the people that they have. It will just take a little longer to repopulate. Adding eight thousand more from Arton would hurt Arton and it really wouldn't change all that much on Mars or Earth. I propose that we take no more than a couple hundred people back with us and only those that are determined to go. I would like to take as many plants as we can. Obviously we could not fill our ships with plants but we could take enough to establish several hundred new species on Mars and Earth. We should take a sampling of Animals back to the San Diego Zoo and that is about it. We should call on this planet once every twenty years or so but not bother to resupply them. They have everything they need or deserve. I think we should park two of these ships in orbit around Earth and two in Orbit around Mars, so if Mars Runner ever craps out we can still get back and forth to Mars. By the time Earth is ever postured again to take on space exploration these ships will have been long dead. By having them, though if some catastrophe were to hit the solar system we could always use them to move a few thousand humans to Arton. Any suggestions or comments?" "Yes," said one of the Captains. "We don't have the final say, but I believe the planetary leaders would agree with the plan that you just outlined.

It took them four months to load the plants, some thought that they should take some Arton Natives back to Earth. They finally settled on taking no humans other than the crew of Arton Three and only one hundred Arton Natives. The justification for taking any natives at all was to preserve the species if Arton were to be destroyed. They knew that the natives would never be contented living among Earth people so they decided to plant some of their native plants on the Hawaiian Island of Kauai. It came closer than any place on Earth to matching their native habitat. They would assign only two human volunteers to live with them and care for their native plants which needed no care on Arton. They already knew they could not count on teaching the Artonians to care for them. They had considered putting them in the San Diego Zoo but these weren't animals these were sentient beings. They decided that

they would select 75 natives from the outer island population and twenty five from the more advanced inner island group. They decided to take none to Mars. They figured that Artonians would not understand low gravity.

It was a real shock when they were approached by one of the Artonian inner island natives who had read about Mars and he wanted to go there. Not only did he want to go there but there were another thousand Artonians, all from the upper class who were well informed on Mars and said they wanted to live on Mars also. We know that your people eat animals and animal products and we condone your practice because we realize that you are from a different culture. We also know that Mars already produces a huge surplus of fruits and vegetables and with the addition of an ample supply of our native plants and vegetables that we can grow on Mars we will be just fine. I think I would enjoy the low gravity and I know the importance of the required daily workouts.

It seems that this group was motivated to learn about Mars and once an Artonian is properly motivated he can accomplish anything that a human can accomplish. They had a lot easier time in learning English than humans had in learning their language. There had long been held on Arton that these upper class people were the next evolutionary step for the natives of Arton. Admiral Carter had a long talk with the members of the group that wanted to go to Mars and finally they managed to convince him that they were sincere and understood what they were getting into. The crews then harvested enough Artonian plants with the help of the ones that were going to Mars to fill the cargo bays of the Arton Three. Arton Three and four would be the two space craft that would establish a parking orbit around Mars.

They then reconsidered and elected to take only upper class people to Earth. They put the word out that they were seeking volunteers to migrate to Earth and had over five thousand applicants. They took one thousand of them but only the ones that knew about Earth and knew what conditions awaited them. The group themselves decided that they had rather go to San Diego than to Kauai. Most of them volunteered to raise Artonian and Earth fruits and vegetables. Some of them even volunteered to work in the San Diego Zoo as grounds keepers and care givers to the animals. Once again, they were motivated. They said that they understood about caring for plants. This group selected even more plants from Arton for them to care for when they reached San Diego. Before they departed they had two of the giant ships loaded with Artonian plants.

CHAPTER – Captain Horn reevaluates the Artonians

September 4, 2175: The four Arton ships departed Arton bound for Mars. Two days underway an Artonian entered the human dining room of the A1 and

walked up to a table where Captain Horn and two of the ships officers had finished dining and were engaged in small talk while remaining at their table. "Gentlemen, may I sit with you for a moment there are several things that I would like to tell you." The officers invited him to sit down. "Let me introduce myself, since I can't even pronounce my name in your language you can just call me Ben." "Ben then produced a copy of the "UPDATED INFORMATION ON ARTON" report from his fanny pack. There are several places in this report where I could take exception but that is not why I am here. One thing that I do agree with is that we have a retention problem when we are not motivated. I was born into what you describe as a first century culture. Fortunately for me your people provided me with access to a twenty second century culture. I was motivated early in life to learn to read write and think in the English Language. My parents (plural), yes I was raised in a home with a mother and a father, were both fluent in English. In our home we did not use the native language and I do not speak it fluently. As I grew older I was strongly motivated to close the gap, to catch up. I was a prolific reader and have read hundreds of scientific books in English. Since I was motivated to remember what I read I did remember it. I was determined to close the gap from being a first century man to becoming a twenty second century man. I accomplished that goal years ago. Let me tell you a little more about my species. I found out that when properly motivated we have better memories than your people have. Not only is this true of me but it is true of all of the people in my group which you have brought on this ship. There were only about three hundred of us on Arton. We figured that if you knew who we were you would not remove us from Arton. Now that we are well underway it would be highly impractical for you to return us to Arton. Besides there are still a little more than one hundred of us still on Arton. From what I know of evolution we are the next step up the ladder but I have some sobering news for you, we skipped a rung in that ladder. The common people that live among your people on several Islands are truly Neanderthals, I had originally assumed that I was Cro-Magnon on the evolutionary scale but since every one of my people on this ship has scored over 165 on human IQ tests we have adopted a new classification term for your evolutionary scale. We classify ourselves as homo-futures. We are present day living examples of what the future holds for mankind. Gentlemen, the charade is over, you can quit treating us like children now. If my you are correct in thinking that my people are motivationally challenged then then I am here to tell you that we have met the challenge. Most of us made the dietary change early in life and started cooking our food. As you know, on Arton it would be inappropriate to eat any of the animals inhabit the planet. They are too intelligent to slaughter for their flesh, and besides that their meat tastes terrible. On several occasions I have had the opportunity to taste the flesh of your farm animals and I love it. I myself am particularly fond of Chicken Tacos. I hereby request that from now on we be allowed to eat what you eat and eat it right here in your dining room. We would like access to all parts of the ship that a human passenger would have access to, Including the ships library. We would like instruction in the use of computers which we have never had access to. That

concludes my spiel gentlemen, what do you think?"

"I would like for you to accompany us to our science lab and I would like to hear how you come off talking to scientists in various disciplines. I want to listen in while you discuss science with scientists. I would also like to choose one other member of your group, at random to join in on this challenge." Captain Horn responded.

Ben accompanied the officers to the floor where the Artonian passengers were billeted. Captain Horn selected the first passenger they encountered and the five of them headed for the science lab.

The first scientist that they encountered was a theoretical physicist named Myron Ashton. The Captain explained the situation and Myron started cutting loose with the jargon. He went on for about one full minute and Ben held up the palm of his hand to Myron. "What is it," Captain Horn asked Ben. Ben responded "Does this guy have all his marbles, Captain?" "He is talking as though he did not realize that he was addressing an orangutan." With that Ben busted out laughing, Ben's companion also busted out laughing. The door to the lab swung open and five other Artonians entered the room almost in tears from their laughter. Ben said, "You gotta, admit that I had you going there for a few minutes didn't I Cap." At that point the captain and the other two officers realized that they had been the butt of an Artonian practical joke and they busted out laughing.

Despite the proven inaccuracy of Ben's claims Captain Horn had gotten the point of Ben's joke. For the remainder of the Journey Captain Horn and the officers of the ship saw Ben's people in a whole new light. The Artonians did get the run of the passenger section of the ship, people began to treat them with a modicum of respect. When they were offered the opportunity to actually eat human food they respectfully declined but suggested that the Artonian food be served on the food line and they be allowed to dine with the other passengers and crew. That request was also granted. It was interesting to note that at all future meals the Artonians did not congregate as a ghetto but would ask politely if they could join humans that were dining.

Ben had not lied about one thing the Artonians on the ship were a cut above the rest of the Artonian civilization. They did read a lot of books, and they were motivated to learn, they did have an above average retention rate when motivated . It would still take more than one generation to leap 22 centuries ahead in time. Captain Horn requested that all Artonians be given a standard IQ test. The average score was 98 but Ben scored 131, which is just below the genius level for humans.

CHAPTER – Artonians arrive on Mars

February 12, 2176: Arton Three makes Mars Orbit. The the following day the other ships made Mars orbit For the remainder of the journey Ben and

several of his companions were taught various jobs that were being performed by the crew. When they reached Mars approach Ben and his people were at the controls and made Mars orbit without a hitch. Of course they had competent human supervision, but not once did a human have to intervene. The little Artonian space men had performed their assigned jobs to perfection. Ben had been on the bridge and filled the role as Captain with Captain Horn looking intently over his shoulder.

The Artonians destined for Mars had traveled on Arton Four. They proved very popular on Mars. While the Arton ships had been gone nothing big had transpired on Mars. Mars had pleaded their case successfully with Earth that even though they still had fifty thousand population the people who remained were mostly past their child bearing years and if they didn't get some young people back from Earth Mars could eventually die out. Even though Josh had a thousand things that had to be done for every worker he saw the reason and logic behind Mars argument. A trade was negotiated to trade two thousand five hundred older Martians for two thousand five hundred younger people from Earth who still had their child bearing years in front of them. The ones that Mars sent to Earth were all accomplished journeymen in their trades and could be of immediate use on Earth. The two thousand five hundred young people that Mars got in return were mostly still in school. They were not worth all that much to Earth at the moment. The people who transferred were all volunteers. A lot of the parents on Earth sent their children to Mars to live with their grandparents, a lot of the people from Mars going to Earth had a chance to see their children and grandchildren. Now that Mars Runner was not overcrowded nor overworked and now that the ticket price was just a nominal service charge for travel in either direction there were more people moving back and forth. There were even some people traveling as tourists between the two planets. The journey between Mars and Earth in the twenty second century had become tantamount to travel between Europe and the Americas in the nineteenth century.

Mars launched a communication to Earth every evening at 1800. Earth launched one to Mars every morning at 0600. The latest news from each camp was always included with every transmission along with personal messages, photos, film footage, including home videos. There was of course no charge for this service. They hoped at both ends to one day have the internet working on Earth again so they could reestablish the direct internet connection but for now twice a day radio communication would have to do.

The Artonians were a big hit with the Martians. These adorable little imps won their hearts immediately. When the Martians finally realized that the Artonians were actually sentient beings and not animals they were welcomed into the Martian society. There were plenty of vacant houses available because of all the Martians who had been sent to Earth. The Artonians were given their choice of where they wanted to live. Most of them elected to settle in New Phoenix. All of them had numerous job offers. The Artonians had come to Mars prepared for a new life style. For their first six

months on Mars they would all be working with Carl Jacobs, Abner's son who now ran the farm operations on Mars, in establishing the Artonian plants on Mars. Carl thought it would be better if they were scattered throughout the many caverns rather than to be located all in the same place. Within two months there were over a million Artonian plants growing on Mars. Within six months they were harvesting fruits, vegetables, nuts and greens. At first the Martians thought so many plants was overkill but once they tasted them they were almost ready to let the Earth plants die out. Everyone preferred the Artonian products. The winery even started experimenting with making wine from Artonian fruit. Within little over a year there were new wines on the market different from any they had ever produced before. There was some concern whether or not the Earth Bees would pollinate the Arton plants but not to worry the Bees couldn't tell the difference, they just pollinated all the plants. Five hundred of the one thousand Artonians made it their life's work tending plants and trees for the farm. The other five hundred found various other employment within the Mars Community. The Artonians loved the reduced gravity but kept jumping too high and spraining ankles when they came down.

A monument had been erected in New Phoenix in memory of Tim Erkin, a true pioneer who had become known as the father of Mars. Tim had a place in the history of Mars equal to that occupied by George Washington, in the United States. The inscription at the base of the statue read "In Loving Memory of Timothy Farnsworth Erkin, Born in Houston, Texas July 14, 2082 arrived on Mars September 28, 2107. Died in New Phoenix, Mars September 28, 2167 at the age of 85. He spent the last 60 years of his life developing Mars.

Tim had lived long enough to see settlers leaving Mars returning to Earth.

February 22, 2176: Arton One and Two break Mars orbit bound for Earth.

PART III

CHAPTER – Contact with Dedov

One of the scientists had shown a couple of Artonians how to operate the now abandoned Telescope in the observatory and the Radio telescope there. They were fascinated by the optical telescope and began spending their free time searching the heavens.

March 18, 2176: One evening while they were searching for Pluto they caught a spaceship coming out of Warp and entering the solar system. Since the four Arton ships were accounted for this had to be from some unknown location. They immediately had the presence of mind to hit the record button and caught the event on video. One of them continued to monitor the

ship while the other used his cell phone to call for assistance. When the scientists arrived they couldn't believe that these two little people had just made the biggest discovery in history. From that minute on every move the vassal made was caught on tape. The space ship established orbit around one planet after another working their way in toward Mercury. They would remain at a planet for a day or two then move on in to the next planet toward the sun. Eventually they reached Mars and made orbit behind the Arton Two. By the time they arrived the two space ships had been fully crewed. The Aliens apparently mistook the Arton Space craft for orbiters, they paid the ships little attention. They then launched four shuttle from their ship. The Shuttle made methodical passes over the entire surface of Mars. Seeing the few buildings on the surface and the now inactive mining operations and apparently reading the atmosphere and finding it unusable they returned to their ship. Three beings wearing space suits then boarded one of the shuttles and flew toward the Mars Orbiter. Their docking equipment was a large suction device that would match up with any object that they found in space.

Since the ship was first spotted in the solar system the communications crew in the Arton Three had been recording all their radio transmissions and feeding them into translator equipment. It was determined from the way they spoke that these were very humanoid beings. Their language was very difficult for the translator to do much with. Two of the communications crew members were Artonian. They were doing better than the electronic device. When the translator made an error in translating a word the Artonians were beginning to pick up on it and correct the translator. The crew had determined that the visitors meant them no harm and that they carried no weapons.

They were amazed when they entered the Orbiter and saw the two Fred Harley and Alvin Jones on duty. The beings acted very excited. They were definitely humanoid. They had two arms and two legs and were actually so similar to Human Beings that one of them could pass as a human but if you were to see a group of them together you would notice that their heads were a little higher in back and a little wider and the skull protruded about half an inch further in back. Later analysis showed that their internal organs were almost identical to humans. They were on an average two inches shorter than humans and weighed on an average seventeen pounds less. Some of them had dark blue hair that could pass for black. Their blood types and teeth were identical to humans.

Fred and Alvin had known they were coming so they showed no alarm when the aliens entered the orbiter. Fred merely looked up and nodded a greeting to them then continued with what he was working on for a minute or so. Alvin just more or less ignored them. The aliens had consulted a hand held instrument then removed their space helmets. The Earthlings noticed that the older of the three aliens had positioned himself in front of the other two. Both Earth men left their work stations, moved slowly over to the one that was obviously the boss. It had earlier been discussed and decided that they should the little traditional Japanese bow rather than to offer to shake hands. Alvin,

standing just slightly behind Fred held the translator in his left hand. Fred addressed the Alien first, "Welcome to Mars," he said slowly and distinctly. The machine uttered four syllables that were Incomprehensible to Fred and Alvin but it brought a smile to the faces of the aliens. The leader then uttered three syllables and the alien translator said "Thank you." "The translator parroted the same three syllables that the alien had just uttered. Alvin kind of chuckled, switched his machine off and laid it on the table beside him. This could get confusing using two machines. It was obvious that both machines had the same function.

. Finally the alien holding their translator machine smiled at the others and gave the thumbs up. He must have indicated, "Got it." The leader of the group was then handed the device by the technician, who had been working with it. The leader spoke into the machine in his native voice and the machine translated what he said into imperfect English. "We from planet #####, we come peaceful. Explore #####. What planet you from?"

Fred did not have a chance to respond, a small intercom speaker affixed to the wall of the orbiter came on. "This Captain Cummings of the space ship Arton Four." The alien machine did not translate this but all three aliens looked up at the box on the wall, indicating they had heard the noise but their translator couldn't handle the translation. Alvin retrieved his translator and repeated, "This Captain Cummings of the space ship Arton Four." Alvin's machine translated that immediately. The alien continued, "Thank You, we need new planet, our planet break up, loose orbit looking for home for our people." "Any other planet this system make home for many people?" "No, Fred answered these planets all dead we use for mining operation." "You have room on your planet for more people?" "No, too many people now," said Fred "hungry people we need more planet also. "OK we ask other ship visit your planet soon? Maybe we can help you people. If we find more good planet than we need we tell you people. Our ship very fast, go warp 4." The alien turned to leave, "Wait, how many people you have need home for?" "Our planet now has four million people and it is no bigger than this dead planet here." Fred pulled out a copy of a chart of planets that had been discovered from the observatory on Arton that showed the 105 other planets worth exploring someday. "Is your planet on this chart?" The alien studied the chart for a minute. "Yes, Yes, Our planet circle this sun right here, that our planet see." The alien pointed to a planet six or so light years from Mars. "Fred thought these poor guys are a year and a half from home already at warp 4.

Fred also noticed that the quality of output from their translator had suddenly improved. Fred had started to say "Sorry I can't help you when the intercom from Arton Four kicked in. "This is Captain Cummings again, you did a wonderful job ensign Jones now please direct these people over to the Four. Tell them I will have the door open for them to fly their Shuttle right on board and tell them I will be expecting them. "What was that noise?" The Alien asked. "That was the intercom from the second ship behind us in orbit. My Captain is on that ship and wants to talk to you." The alien thanked Fred, disappeared

through the air lock broke connection. As the alien shuttle approached the Four a gaping hole appeared as the boarding lock opened. The alien commander never hesitated, he flew his craft right into the Arton Four. Captain Cummings had rigged his office so that everything said on the ship was being transmitted to the planet.

Cummings started out by saying that he did not have a translation machine so they would have to use the one the alien had. Actually Cummings did have one that had become programmed to the alien's language during the last five hours. Cummings figured that two translation machines in operation would just confuse matters. The alien's machine said "Greetings, my name is #####, of the planet ##### (that is the way Cummings translator worked also, if there was no word for what was being said it would just beep, this one clicked.) We are unarmed and come in peace, Our ship carries no weapons not even for our defense." "I know said Cummings that is why I am talking with you. We have already scanned your ship and found it clean." "We scanned your ships and the mining colony down there and found them clean also. Where do your miners stay, underground? If you can breath the atmosphere on this ship you sure couldn't breath the air on that planet." "Yes the miners are housed in an underground airtight cavern." "Did you listen in on my conversation with ensign Fred? If you did then you know why we are here. We are disparate people, we have more people than we can feed, many are dying from starvation. We are not and never have been aggressive people. We are what you would call pacifists. The only way that I have of proving this to you is our literature which you can't read at the moment and our videos. You can watch thousands of hours of our videos and never see a weapon of any kind." About that time a shuttle from the planet flew into the landing bay. "Please come with me gentlemen, we are going to take a little trip to the planet. If you have any others you would like to bring along we can pick them up at your ship on the way down." "How many more does your shuttle carry?" Each shuttle holds sixty passengers how many shuttles do you require?" "First lets just us go to your planet then we can send for others." After boarding the shuttle the two other aliens handed their translators to the leader who plugged them into his and pressed a button on his. All three translators began to hum. In less a minute the leader had apparently updated the other two translators.

CHAPTER – Dedovians visit Mars March 2176

"I never expected anything like this the alien said when he stepped out of the elevator in the Utility cavern and onto the waiting bus. They were whisk away through the Ocean cavern, then a slight detour through the vineyards in the Hour Glass cavern to New Phoenix. When they got off at the old Federal building in New Phoenix all of the leaders of Mars were waiting for them. They

had all either heard or been briefed on what the alien had to say. "If what you have to say is true and so far we have every reason to believe that it is perhaps we can help you. Here is our situation." He described the destruction of Earth, and the loss of their nine billion people. He explained that the population of Mars had been depleted to help with the re population of our home planet. He told them that either Mars, Earth or Arton could accommodate their entire population. Our question for you is how fast you could move people to Arton and how fast could those people learn our language."

The Alien studied the chart, did some computations then announced, "I make it to be a little under one light year from ##### to Arton. We have thirty ships, capable of Warp speeds They can each transport 864 passengers. With no cargo and over crowding we could maybe take 2,000 per trip. A round trip would take by your calender, about five of your months. That would only be 60,000 of our people in one of your years. By making new ship production our only priority, we could possibly move a little over one million of our people to Arton, and then if our planet remains viable for another fifteen of your years." You must understand that we never entertained any hope of getting all of our people off of Our planet. Our aim was to establish a significant presence on some other planet in order to preserve our race."

Captain Cummings put in, "the people that you transport will not be able to remain on Arton indefinitely, but Arton is still closer to your home planet than it is to our home planet of Earth. Arton would be just a temporary place for your people to wait for transportation to Earth. There is someone here that I want you to meet. Gil come up here." A little Artonian stepped forward and held out his hand to the alien. "These people have said much but let me be the first to say "Welcome to Mars." A dead silence fell over the crowd. Gil had just addressed the alien in his native tung. "Captain Cummings stammered "Where and how did you learn their language, Gil?" "Oh, I am not yet proficient in their language yet but I have been listening to every word that has they have said since they arrived and I have picked up enough to say a few simple things, it would probably take me more than a week to become proficient. How did you think that all of us learned your language as quickly as we did? There are some things that Artonians are better at than humans are . Language just happens to be one of them. You might just say that Artonians have a faculty for languages."

Gil then addressed the alien " You have probably guessed that I am a native of the planet Arton. There are about as many humans on Arton as there natives. Soon I will be able to speak your language fluently. Our brains are arranged differently than the human brain. The temporal lobe of our brains is almost three times the size of the temporal lobe in the human brain. The Frontal Lobe however is half the size of the frontal lobe of the human brain. In a nutshell this means that humans are better than us at reasoning and problem solving and we are better at languages and speech. Humans show more individuality." Gil spoke his later words in English and they went through the translator machine.

Captain Horn of Arton Three spoke into the translator. "We only have four craft capable of Warp speed but they can carry up to five thousand people at a time if we carry no cargo and put atmosphere into the cargo holds. Our ships are larger than yours and are capable of speeds up to Warp eleven. How long do you have before your planet is no longer habitable?" "Perhaps at least ten but not more than 20 of your years. I am just not comfortable yet in converting time to your years." "I am sorry for that but it is the only way any of us have ever thought about time Increments. One year is how long it takes our home planet to make one complete orbit of our sun, for example a man can generally live for about eighty years." "In that case we may have from 15 to thirty years. Where is your home planet, Captain?" "It would have been the next planet you would have come to in your search of our solar system. Had you not found us on Mars you would be on Earth by now. Earth is six times the size of Mars and was overpopulated by twelve billion people when war destroyed almost every living thing on the planet. That was only about fifty years ago. People from this colony on Mars have repopulated the Earth but with only about two hundred thousand people. The infrastructure was only damaged and has been found to be ninety percent usable. It was the animals that all died from radiation poisoning. We believe that the war came about from a lack of our ability to really communicate with one another. There were over three hundred languages on Earth at the time of the destruction and more than 150 separate nations. Most of them possessed nuclear weapons so when the first one went off everyone else launched all they had at the nation they perceived to be their arch enemy. In two hours the atmosphere became lethal. Within a few days all the land creatures on earth, including man became extinct. Twelve Billion was far too many people, a large number of those people were starving to death every year. Now there are too few people. We feel that the right number of people for Earth would be from one to five billion. We made a vow that from now on we would only allow one language to be spoken on Earth. All of us who survived on Arton, Mars and in space spoke only the English language so it is only logical that in the future all people living on the Earth must speak English fluently. All of the people on Arton and on Mars speak only English."

Captain Cummings added, "Once we get the course down pat from your planet to Arton our four ships should be able to transport about four hundred thousand of your people in one years time. I am sure that all four of our ships will be at your service but at the end of one year our ships are going to have to start moving the people that you have on Arton to Earth. We still have three ships that are capable of speeds just under Warp that can take of the run from Mars to Earth. Two of these ships have been decommissioned for many years but they are still in a parking orbit around Earth and could be put back in service."

The alien said I can not believe our good fortune I will radio home as soon as I return to my ship and give them all this good news." "What do you mean radio home, our ships will be there long before a radio signal could reach

your planet.” “Then perhaps, my friend we have something we can give you. Many years ago we developed hyper space radio. When I talk to my home planet they hear what I am saying as though I was only next door.” “I always hoped that something like that would come along, for us our radio signals are limited to travel at the speed of light.” “We have at least six spare radios on board. We will rig Mars with one, leave one here for your interplanetary ship to take back to Earth and fit each of your space craft with one. I will have one of our other ships drop one off on Arton, on their first trip there. I am going to recall all of our space craft to ##### as soon as I return to my ship. They could begin the evacuation before we get there. When the first of them makes Arton orbit they can shuttle the planet leaders to the ship and you Captain Cummings and You Captain Horn and Gil of course, can explain what is happening.

That evening a special communication was sent to Earth and to A1 and Arton Two telling them what was happening. A communication shot back within 24 minutes asking them to confirm on the other channel. The other channel was the voice channel and was seldom used. Once a link was established Captain Cummings gave a verbal description of the events followed by Gil giving a verbal account in the Artonian language then by a “COME BACK” 26 Minutes later an Artonian voice came on the line speaking in Artonian. It requested that another Artonian send the same description of events in the same language. After four hours of verification Admiral Carter was finally convinced that this was the real thing and that Mars was not being held hostage by these aliens. The Admiral told them to go back to the text channel and send him all the details they could think of. Within an hour Mars was transmitting everything they had learned so far. “Gil who had been talking with the Alien all this time had told him to go ahead and shuttle his people down for a visit and a Tour of Mars. The Alien said that their shuttles were too small so Ben asked the Council Chairman to dispatch one shuttle to the Alien ship to bring down passengers. Ben then ask for fifty or so videos that the alien had referred to in an earlier conversation. Ben also requested a grammar book if they had one and a couple novels. By this time there were fifteen Artonians listening to every word that was spoken and learning the new language.

In their conversation Gil finally learned the Alien's name and the name of his planet. The planet was called Dedov, the Alien was Captain Eurokoma. Ben passed this along to the Radio Room to be Included in the next transmission to Earth.

The shuttle landed and a bus picked up the crew members. There thirty seven crew members on the shuttle five more had stayed behind to maintain the ship. Twelve of the crew members were female, the rest male. The bus driver took them on a driving tour of Mars, all of the developed caverns and even some that had been pressurized but had little development. The driver ended the tour by dropping his passengers off in downtown New Phoenix. Gil welcomed them in their language. He asked if they had brought the books and videos that he had requested, they had and they handed them to him. All of

them were a little taken aback by this strange little hairy man that spoke their language, but not very well. They just couldn't believe that he had learned it in a few hours. One of the council members brought a clipboard with a lined tablet on it and asked Gil to get everyone's name they it would sound out in English and write the names on the tablet along with their rank or job or some other identifying characteristic. Gil started gathering the requested information. When he was done the councilman took the clipboard and ran off with it. The crew members found seats at the tables in the town square. Each of them had an empty bag that he used to put his space suit in. Gil then started describing to them what all had taken place. By the time he finished the councilman had returned with name tags for each of them. Gil explained that they should affix these to their jumpsuits above their vest pockets. They willingly complied.

In appearance they were quite similar to Captain Eurokoma, similar enough to tell that they were all of the same race. All of them possessed slight variations in appearance just as Artonians and Earth people did. Gil asked, at the suggestion of the Council Chairman, if any of them were hungry or wanted a beverage. That set off a round of conversations that Gil could not follow. Then a lieutenant Soravov asked "What do you people eat and drink?" Gil explained human food to them then he explained Artonian food to them. He told them that we all drink fruit juice from many kinds of fruit combined in many different ways. It is the most popular drink on Mars, but everyone has their own favorite concoctions. I will just have a variety set out and you can taste several. I will also have them set out a buffet of human food and Artonian food for you to sample." Within minutes there were a dozen pitchers of Juice set out and one of plain water. There was a stack of reusable plastic cups. Within an hour there was a makeshift buffet set out on several of the empty tables shoved together. There were trays, silverware and napkins as well. One of the councilmen was getting all this on video. The juice was sampled with about the same reaction you would expect from a group of humans trying a new product for the first time. Some of the Dedovians had two glasses of the same juice, several went for water and had several glasses of that. More water was summoned. Some tried a little of several juices then settled for a full glass of the one they liked best.

When they took a tray they knew what it was for. They knew what the napkins were but examined the silverware closely before attempting to use it. They exhibited little skill in handling the silverware. One of them fished around in his pocket and came up with a pair of tongs. He used the knife he had been furnished and proceeded to eat contentedly. The others just did the best they could with a fork and a spoon. The food item that was most popular with them were the cooked vegetables, none of them took any meat but the boiled potatoes went well. None of them took any of the raw vegetables from the Arton food selection but they all took raw fruit and fruit salad. Gil had a brief conversation with lieutenant Soravov then explained to the servers "These people from Dedov are vegetarians though they are familiar with cheese, they would like to try our cheese and they wondered if we had any nuts. They customarily eat with a small pair of tongs and a sharp knife. They also like

bread. They drink milk from dairy animals. They also drink wine and they like a product that sounds a lot like beer. Could you kitchen folks see if you could find some of the foods they like but that you do not have out.

Soon trays of cheese and crackers and bread and pitchers of wine appeared. Several pitchers of milk were brought out and a large bowl of nuts. "That is wonderful" said lieutenant Soravov, "You have all the foods we like."

The fifteen other Artonians that had been learning the language appeared and helped themselves to a tray of raw fruits and vegetables and glasses of juice. They seated themselves with the crew wherever there was an empty seat and struck up small conversations. Lieutenant Soravov asked Gil "How is it that you people speak our language?" "Gil started to reply but then realized that Lieutenant Soravov had asked the question in English! Gil replied in English "We learned your language since you have been here, apparently you have learned English since you have been here also." "Not so much, we are not as quick as your people are."

Admiral Carter had said in his latest communication that he was willing to take the gamble. I just finished watching the video of the crew having lunch and we all came to the conclusion that these are sincere people of good intentions. We are convinced that their planet is in a disintegrating orbit and we are going to help save as many of them as we can. I will see you on Arton in about six months Captain Cummings. Make sure that you have that radio for us when we get there. Beyond that continue sending all the information that you are able to gather on these people. I would be especially interested in hearing what our Artonians discover from their videos and books. We will outfit our ships for maximum passenger accommodations and plan to depart Earth for Arton within one week unless we hear from you otherwise.

CHAPTER – Earth and Mars help Dedov

July 28, 2176: One by one the space fleet of Dedov began to return to their home planet. One ship had stopped at Arton and installed the hyper-space radio equipment in the Arton orbiter. The men working in the orbiter had no idea they were coming. They just didn't know what to make of having Alien technicians board their orbiter and start installing radio equipment. The technicians did not seem threatening and seemed to be doing what they had been told to do so the two men on the orbiter did not interfere. In the Mars communications center the radio message from Arton came in loud and clear. The speaker on Arton was speaking in the language of Dedov. Someone at Mars communications called Gil. Gil was nearby and was there almost immediately. Gil listened to the brief message for a moment then began to speak into the microphone on the desk. Gil conversed back and forth with the speaker on the other end for about five minutes. Then Gil began to speak in English, addressing the men in the Arton orbiter and the men in the Mars

communications center at the same time. "This is Gil on Mars, the technicians who are in your orbiter are from the planet Dedov. We are already quite familiar with this race on Mars. The people there have just finished installing a hyper-space radio in your orbiter. They are leaving another radio with you that you will have to figure out how to install on Arton. I suggest that you install it where my people live on the upper class island. Artonians are more adroit at communications than Earthlings are. One of the men working in the orbiter came back in English with one question after another. Within the next hour Gil had brought them up to date on the entire situation. The radio had already been installed on Mars Runner and on the Earth orbiter. Arton now had instant communications with the star fleet Mars and Earth. Gil told them that the four Arton ships were en route to Arton and should arrive in about two months to assist with the evacuation of refugees from Dedov. Gil asked them to try as best they could to prepare islands on the planet to receive up to one million refugees over the next several years. Gil explained that this would be temporary until the bulk of the refugees could be transported to Mars and Earth.

April 22, 2178: All four of the Arton Ships had been to Dedov and had transported 40,000 refugees to Arton. The Dedov fleet had transported 60,000 more so now there were almost as many people from Dedov living on Arton as there were humans and Artonians. The natives of Arton no longer seemed as oblivious to the affairs of their planet and the other beings on it as they had once seemed. The assignment that they had received to teach English to the people of Dedov had caught their interest. The island of elders had sent boats to the islands where the Artonian natives resided and transported a representative group of natives to each of the islands now populated by refugees. Even the disinterested Earthlings on the planet had taken up the cause and were using their boats to transport what surplus they had or could produce to help feed, clothe and otherwise assist the newcomers. Despite the best efforts of the Earthlings and Natives of Arton the conditions in the refugee camps was appalling and still deteriorating. Yet more new refugees arrived almost daily. When they arrived they each had a small valise of their personal belongings and nothing else. They had been told that there was plenty of food on Arton and there was. Plenty of food to prevent starvation but not the food that they were accustomed to eating. They had taken up fishing and were developing a taste for the abundant seafood of Arton, that resource that had never before been harvested, was abundant and easy to gather. No one starved or even went without enough to eat but they had to improvise beds from plants, occupy caves when available, do without toiletries and all the conveniences that they had enjoyed on Dedov.

May 17, 2180: Conditions on Dedov had worsened much sooner than had been anticipated. The planet's orbit had rapidly become more eccentric. The rescue effort knew that they would be lucky if it held together for another six months. The efforts of the combined space fleet had succeed in removing another 150,000 refugees but conditions on Arton had also deteriorated. Disease and hunger for their customary foods were taking it's toll.

CHAPTER – Hopeless Rescue – Miraculous Save

May 25, 2180: All was turning to despair then out of nowhere a space ship materialized into Dedov orbit. It dwarfed the pitiful ships being used by the space fleet of Earth and Dedov. Minutes later another of an entirely different design materialized, followed by another and another. Within one day there were a total of 75 ships in orbit around Dedov. All of these ships were basically saucer shaped but they each followed a different design concept. Arton Three was just approaching Dedov and had come out of Warp drive when their radio boomed on.

“Attention Arton Three,” the voice said in English, my name is Funutuioie, I am the commander of a fleet of ships from what would translate in English to “The Intergalactic Association of Civilized Planets.” We have been Monitoring the events of Earth, Mars, Arton and Dedov for a long time. None of your planets have ever attracted us to make contact with you. None of you have ever met the minimum qualifications for Inclusion into our society. Frankly until Earth suffered its catastrophe, Earth worried us a great deal. Since the holocaust on Earth we have been very pleased to see the change in the Earth, and the attitude of the people now living there. We have been sending ships to patrol Earth for the last four hundred of your years. The only reason that we have now chosen to intercede is a charitable interest in rescuing the people remaining on Dedov. We have dispatched an adequate number of ships to remove the remaining population i during the next 26 Earth days, four hours and 42 minutes to be exact. That is that is precisely the time remaining before Dedov will loose orbital stability and plunge into it's sun. Don't worry before that happens all of the people will be safely on Earth. Please communicate this message to all the other ships in your armada and have them start loading as many of the pitiful refugees from Arton as they can accommodate and move them to Mars. Don't worry about the rest of them we will transfer those remaining on Arton to Earth for you. Beyond this one gesture of good will , that we are committed to , you will not hear from us again until you have developed enough to be invited to join us. My best estimate is that will be several thousands of your Earth years from now. You should now get on your radio and retransmit this message to your ships and planets. By the time you get back to Earth or Mars the people of Dedov will have been there for several of your months. We will take over the rescue effort from here on . Once again ,this is the one and only communication you will ever receive from us, until we deem you ready to join us. Good luck and God's speed.

The com center on the Arton Three had recorded the entire message. It would be played again and again on Arton, Mars and Earth, over the coming centuries.

Captain Horn of Arton Three immediately relayed the message that he had received to all of the planets and ships, but they had already heard the original message. All of the ships from Earth and Dedov went directly to Arton and began loading refugees. Several of the ships were already loaded with refugees from Dedov so they just changed course and headed for Mars. Six Months later when the Arton ships came out of Warp drive and approached Mars they learned that indeed the entire population of Dedov had already been on Earth for more than five months. The ships of the intergalactic Association of Civilized Planets had done exactly as they said they would do. Within four days of the transmission their ships had begun to materialize in Earth orbit and shuttle the refugees to down to the planet.

CHAPTER – Earth receives the refugee from Dedov

June 1, 2180: The saucer shaped shuttles each carried 950 to 1050 passengers. The shuttles all landed in open spaces in the American West. They always landed near rivers. As soon as the last passenger was clear the shuttle would return to the mother ships for another load. Each passenger carried a bundle that could be strapped on like a back pack. In each parcel were found 365 packets of food that looked like one ounce plastic tear open envelopes. Instructions, written in Dedovian language, told the user to mix the contents of the package with what amounted to approximately eight ounces of water. This would provide the user with a nutritionally balanced diet. The 365 packets would keep him sound for one Earth year. The product when mixed was tasteless, but after a three ounce meal you were no longer hungry. Each pouch also contained a blanket, an air mattress and a large pack of tissue. Each pack weighed almost forty pounds. In addition to the packs they had been issued each immigrant also carried a small valise of personal belongings, clothes and treasured memorabilia. Each group refugees were put down no closer than one mile from the next group. Within one day's time there were four thousand such groups dotting the American West. The human population of the planet had been told that the mysterious ships had promised to deliver the people to Earth but had no idea of when or where they would be delivered.

The people of Earth, were now outnumbered by the people of Dedov. The Earthlings stuck to their guns and insisted that the newcomers learn English. Since the people of Dedov were a lot better at language skills and since the people of Earth were their hosts they readily agreed to do so. At that point the little Artonian linguists stepped in and started teaching English. Each Artonian was teaching twelve, one hour classes per day. Since the Dedovians also had a faculty for language, they were able to communicate in English within a matter of weeks and were quite fluent by the end of the first year.

The arrival of the Dedovians triggered a herculean effort on the part of the humans on Earth to relocate and assimilate the four million Dedovians into

their population of only two hundred and fifty thousand humans. It took the Humans and Dedovians almost five years to get all the wrinkles ironed out. By the end of five years both populations were totally integrated. The Dedovians had all learned the English language, the populations were totally integrated, everyone had a home, everyone had plenty to eat and everyone had a meaningful job to do.

Soon there were enough hydro-electric plants in operation so that the nuclear plants could be once more shut down. There was actually traffic on the highways and freeways of the American West. Crops were ripening in the fields, grapes in the vineyards, fruit on the trees, Artonian fruits and vegetables were coming to market in abundance. Factories were reopening manufacturing everything from tooth paste to automobile tires. Clothing was being produced the old way, from cotton. America was once again becoming the land of milk and honey.

CHAPTER – Meanwhile on Mars and Arton

December 15, 2189: By the time the Dedov fleet arrived and made Mars orbit the people on those ships were pretty hungry and tired. They had been away from their homes for a long time. They had already been briefed as to what they would find on Mars. Even knowing what to expect they were still pleasantly surprised. Most of them were so thrilled to be on a stable planet with plenty of room and plenty of food that they voiced few complaints.

It took the entire fleet two trips to Mars from Arton to evacuate all of the Dedovians who wanted to go to Mars. It took the four Earth ships three trips.

The people arriving on Mars had also been briefed regarding the conditions on Earth. Almost one hundred thousand of them expressed a desire to move on to Earth. The ships that had brought them to Mars were continuing on to Earth so, after seeing Mars many elected to continue their journey on the ships once they had been provisioned. Meanwhile on Earth there were more than 150,000 people who liked what they had heard about Mars and requested that they be allowed to live there. The population of Mars was once again at two hundred thousand. With so many space ships now at their disposal the Mars Runner was retired.

A Dedovian ship left Earth every Monday morning for Mars. A Dedovian ship would leave Mars every Friday evening for Earth. Passage was free for anyone who wanted to change residence or visit the other planet was welcome to do so.

One of the Arton ships left Mars every three months for Arton. People were also allowed free passage to and from Arton. Once Arton started

receiving regular shipments from Mars big changes took place.. City's were springing up, stores and restaurants opened, corporations formed so that in time Arton bore a quite similar appearance to Earth. The natives of Arton were allowed to remain on the islands they had always lived on if they wanted to but they could board one of the merchant trade ships and get off at any island they chose. From any vantage point on any island you could see several nearby islands. Just as there were no continents on Arton there were really no Oceans either.

PART IV

THE NEW ORDER, After January 1, 2181

(How things worked on the newly resettled Earth)

CHAPTER – The Dedovian Religion

September 17, 2185: The last five years had been a tumultuous time on the Earth and on Mars. Both groups had new cultures to assimilate and new technologies to master. The races were so computable that a male from either race could father a child with a woman from the other race. On Earth there had been no effort to segregate people by race. Inter marriage was commonplace.

December 25, 2185: As for religion, the human survivors had been limited at the time of the holocaust to Christians, Jews, agnostics and atheists. On Dedov religion had not played as important role as it had played on Earth. Perhaps that is why the people of the planet Dedov did not share the violent past that Earth had. The people of Dedov were taught one religious concept as children which they retained throughout their lives. A Dedovian in conversation with an Earth native gave the following description of the Dedovian religion:

“God was the product of evolution that had occurred on a planet long ago and far away. The people of that planet had mastered the art of out of body experience. When their planet had run it's cycle, lost it's orbit and was plunged into its sun most of the population had left their physical bodies and stood helplessly by as they lost their planet. Not knowing what else to do and having no place to go these out of body beings merged into one being. And went in search of a new home planet. Once a planet had been found the being took stock of itself . The entity retained the spirits that had reached a state of perfection and cast out the others. That central perfect spirit that remained is what we think of as God.”

“The other spirits, the imperfect ones were to go to the new planet they had found and seek perfection. Once that perfection had been achieved they were told that they would be welcomed back to join that central spirit as perfect beings.”

“The imperfect ones not knowing how to go about this task of becoming perfect became bored and began to enter the physical bodies of the birds and animals that lived on that planet for a few minutes or hours or days in order to experience life in the physical flesh again for themselves. As time went by more and more of these errant ones became trapped in the physical body of some animal or bird. The central God seeing this said “This will not do, if these errant ones want to enter a physical being then I shall create a being that I approve of as the host animal. He chose a being that seemed to be at the top of the evolutionary ladder and seemed to have more intelligence than the other animals on the planet. God then told the errant spirits that this would be the only animal they would be allowed to enter. They could only enter the body of that animal as it drew it's first breath after leaving it's mothers womb. God also decreed that once a spirit had entered such a body that it must remain with that body until such time as that body was no longer capable of sustaining life. Once that body had succumb the spirit would be free to rejoin the other errant spirits. They could repeat this process as often as necessary until they succeeded in living a perfect life in the flesh. None of the errant spirits ever succeeded in doing this so they complained to God that it was impossible to lead a perfect life in the flesh, the test was unfair.”

“God then sent one of the perfect spirits from his central Godhead to the planet to enter a newborn body and live an explanatory perfect life to show the errant ones that it could be done. The life of this perfect one has been written about in history although he walked on Dedov more than a thousand Earth years ago. His life has been recorded for us to emulate. He has been known as the Son of God. Some of us still try and be like him and lead a perfect life but others have given up trying and just enjoy the physical life that they have been given for the time that they have it. Some have had doubts that there ever was one who lived a perfect life. Yet others have come to believe that if they put their faith in him and beg him for mercy they will be accepted into the Godhead when they leave their physical body.”

“None of us have any way of knowing whether this is true or not, we are taught that we must just accept it on faith. Once we make the decision to enter the physical body of a newborn child we are not able to recall our lives before that moment. When we depart that physical body it becomes impossible for us to communicate with those who remain in a physical body. Thus it is a matter for conjecture whether anyone has ever lived a perfect life on Dedov. It is also conjecture as to whether those who have put their belief in he who did live a perfect life has entitled any of us to return to the Godhead. There are endless conversations and disagreements on this subject. We, the people of Dedov are those errant spirits. There is now much controversy over whether or not us moving to other planets and interbreeding with non believers from other races will have any effect on our eternal lives.”

Our definition of a perfect life is to be able to actually love the most despicable person you have ever met more than you love yourself. That does not mean to give lip service to the concept it means that you must actually feel

that way deep down inside yourself. To my knowledge no one has ever succeeded in doing that but it is what we are all taught to continue to strive for.

“At any rate that is the substance of our religious beliefs in capsule form. I know that you Christians and Jews have a holy books that you read from and you attend meetings in churches, sometimes weekly and sometimes even more often than that. I am quite sure that your religion is far different from ours, though I have never read one of your holy books.”

“Our religious beliefs may not be as different as you might think Agld, Merry Christmas.”

CHAPTER – The new Government

The new Government that developed started with the issuing of credits and kind of evolved from there. As soon as the Government started issuing credits they found that certain kinds of skills were becoming scarce because so many people with those skills had left Government service, striking out on their own. In order to lure those people back to fill the hard to fill positions they started offering to pay some workers more than the basic thousand credits per month. Soon the thousand credits had just became the minimum wage. As the society grew and matured the need for skilled workers in every field was realized. The most critical need was in the medical and technical fields.

One of the first thing the new society had done was to start schools to provide children with a basic education. That naturally lead to starting colleges and Universities to provide those interested in special skills the vehicle to acquire them. Once again Earth was forced into tapping into Mars for help. Mars had been running schools of higher education for centuries and some of their universities had developed rich traditions. Better than half the population of Mars had a college education. Mars sent teams of educators to start the Universities on Earth and to staff them. Mars was where most scientists had gravitated. In the early 23rd Century Mars was a far more sophisticated planet than Earth.

It was also an interesting phenomena that ever since the institution of free interplanetary travel Artonians had been flocking to Mars to complete their educations then returning to Arton to apply what they had been taught of Mars. The natives on the inner Islands of Arton were almost as developed as the Martians. Earth not only called out to Mars to help organize higher education but also to Arton. Artonian teachers and professors were highly sought after and were considered the best instructors because of their patients with the students and because their students were perceived to learn more in a shorter period of time.

The first major University to reopen was San Diego State University followed by UCLA, Cal Berkley and Stanford. When the law schools reopened

everything went to hell. The court system had to be reestablished, then Police Departments had to be formed to feed the Court System. Civil law soon reared its ugly head and lawyers proliferated, not only prosecutors, but the whole gambit of public defenders, private practice attorney's and public agencies for child care, mental hospitals and everything else that fed that system. Old law books were dug out and reprinted. The Constitution of The United States was revised. The voters approved the revised constitution. In the revised form there was no longer a representative form of Government but rather everyone voted on every issue. Anyone who wanted to introduce a bill could. New bills were filtered through elected committees and eventually presented to voters who voted on them directly. A television station presented both the pro's and con's of every issue. People could sign on either their personal communicators or computers were required to give their password before voting on the issue. There was no Executive branch of government. The local committees were only paid a nominal sum for service to the community. There was a citizens committee that supervised the police but any split decisions called for a public vote. The members of the Supreme court ran for the office, anyone running for the office had to have the required number of years of service as judges in the court system. They had to take a written examination, an oral examination, a physical examination and a thorough background check. The results of these examinations were made available to the public, the public then voted on their favorite candidate. A judge was allowed to serve on the Supreme Court until some other judge challenged him for his position. Challengers would be allowed time to plead their case on public Television, followed by the Incumbents rebuttal. Then the public would vote on whether the challenger should be allowed to challenge the Incumbent or not. If the public voted to allow the challenge then the examinations took place. After the results of the examinations were known the public would either vote for the challenger or the Incumbent. Honest men of good faith and conscience were seldom challenged but a scoundrel would be ousted in no time. Most of the members of the Supreme court served for life or until they chose to retire.

The concept of privately owned real property had never really caught on because there was so much of it. There were, however recording books at the local court house where a person could describe the property that he used for his personal residence. In the United States there were the old plat maps, lot numbers, addresses that could be referred to in giving an accurate description of the property. Each person was also allowed to record on one piece of recreational property. The size of any claim was limited to the amount of land required to make the property viable. If a person was running a thousand head of goats on a ranch he might claim that he needed ten thousand acres, but if he lived in a condominium complex he might only be allowed to claim his undivided interest in the complex and his personal interest in the unit he lived in. A person could claim anything they wanted to claim but if another person disagreed with that claim he could call for a hearing where the issue would be decided by a judge. Most people managed to work land use out between themselves and seldom was a hearing called for.

CHAPTER – The New Economy

So far the entire three planet system had been running without any real economic system for the last eighteen years. Everyone had just been too busy to give it much thought. They were trying to get things working again. There were few luxuries or special privileges to be had. Carl Marx would have loved it, the state of perfect communism. The problem with that was that as soon as all the pressing needs had been met people had a desire to acquire luxury items, jewelry, and special privileges that if made available to all wouldn't be luxurious or special. If a person wanted to have a splurge meal, there was no restaurant that served such meals. If a person wanted to give another an expensive special gift there was no place that manufactured such items and no store that sold them. If a person wanted to spend a week on a cruise ship seeing the sights there was no cruise ship. Everyone had tooth paste but it came in a generic tube labeled "tooth paste". So far what exchanges that had taken place had been on the barter system. The planets need an economy.

That set off a two year debate on how such an economy could and should work. On Mars, over the years they had dabbled in currency and an economy only to abandon it in times of turmoil and crisis. Once again the economy of Mars was working in a limited fashion. On Dedov they had a vibrant economy until the planet had faltered. On Earth before the disaster there had been a world economic structure so complicated that no one understood it. What they needed on the new Earth was a simple system that would allow people access to luxuries and special privileges that they had an opportunity to select for themselves. Private ownership of property didn't seem to be an issue with anyone on a planet that had formerly had enough real property to accommodate nine billion people but now was home to only four and a half million. No one wanted or needed private ownership of land. Everyone respected the place where another person wanted to live, if they didn't like it there were millions of other places to live. What these people needed was some kind of enticement to cause companies to produce a better product or induce a person to open an upscale restaurant.

What they came up with was a computer program that started everyone out with the same amount of credits. The arbitrary number selected was ten thousand. Everyone had a cell phone that could access the system but only the individual that owned the credits could transfer a portion of them to someone else. Everyone that performed a job that benefited society in general would have an additional one thousand credits added to their account on the first of every month. If someone wanted something that cost more than the credits he had available he could borrow credits from someone else. The people all agreed that this could, in time, evolve into a good system so the majority was behind the idea.

Over the next hundred years that simple concept grew into a complex three planet economy that actually worked. Within that flexible framework it became possible to lend and borrow money, to receive grants to obtain luxuries and special services, to open businesses to form partnerships to form corporations to do just about anything anybody ever wanted money to do for them. The system was not based on anything but the faith of the people. Actually no economy has ever been.

CHAPTER – The Private Sector

Anyone could quit Government service and go into business for themselves or find a job on the private sector. Corporations were springing up right and left. Several Martian corporations jumped in to doing business on Earth. Among those was Super Stores that opened a chain of retail outlets Big Boy Burger that opened a chain of burger outlets and Hour Glass, Inc. that staked out land in Napa, Sonoma, and Mendocino areas of the former California and started growing grapes. They reopened the long deserted winery's and started producing wine that they marketed all over the United States, Mars and Arton. The Artonian natives wanted nothing to do with the stuff but the humans on Arton seemed to like it. Hour Glass, Inc. also reactivated a number of breweries in the Western United States. They went in to the manufacture of twelve ounce beer containers and glass bottles for wine. The beer products were sold throughout the United States as well as being exported to Mars and Arton. Even with only six million potential customers, Hour Glass soon became the largest corporation in the three planet system.

Big 7 convenience stores from Mars began to open outlets all over the United States and bought products from other manufactures which they sold on Earth and exported to Mars and Arton. They had over two thousand outlets on the three planets. Martian Wood Products, Inc. began harvesting trees in the Northwest, cutting them into lumber and making plywood that they also marketed on all three planets. In conjunction with their lumber yards they opened hardware stores. Since there were not many companies manufacturing hardware items Mars Wood Products, Inc. started up long abandoned factories and started manufacturing their own hardware and paint products. Soon they were also manufacturing tools. They also had outlets on all three planets.

A few fledgling Earth companies began doing business on Mars and on Arton and a few Arton companies began doing business on Earth and Mars. The Government accounting office expanded the credit's system to make it available on Mars and Arton. It took almost one hundred years before the three planets were consolidated under the one government. The capital City of the three planet system was officially located in San Diego, The State Capital of Earth was in Sacramento. The state capital of Mars was in New Phoenix. The

State Capital of Arton was located in Island City, Arton.

The Arton ships and the Dedov ships were beginning to show their age and would soon need to be replaced. The plant where the Arton ships were originally built had been restored to operation. The plans used to construct the original ships were still available. Care was taken with the original now brittle documents and manuals which were all carefully reproduced. Parts were being fabricated, and manufactured. Additional hardware was being ordered. The nuclear drive engines were very difficult but the job had to be done. After much trial and error and testing at the main plant in Bakersfield the shuttles began hauling the pieces into space. Men working in space suits out of the Earth orbiter began to assemble the parts in space.

It took almost twenty years before the A5 had been fully tested and found seaworthy. It took an additional twenty years before the A6, A7 and A8 were on line and the earlier Arton fleet was retired. The A9, A10, A11 and A12 were built to a smaller scale from the original plans used for Mars Runner but carried the more powerful engines of the Arton fleet. These ships replaced the old Dedov fleet that had been making the Mars to Earth run for the last fifty years. Man had equaled his greatest achievement with far fewer resources. It had been feared that the project would bankrupt the economy but in the forty years that it took to build the eight new ships the three planets had all prospered. The ships had been built with a combination of Government and private sector effort. The next major task was to replace all the shuttles and to build and equip domestic aircraft for Arton and Earth. By the time that task was completed they would be well into the twenty fourth century.

When mankind returned to Earth he found an almost limitless supply of electric Automobiles that required only new batteries but in the intervening time most of the cars and trucks on the road had just worn out. The population of the three planets had grown in leaps and bounds everyone wanted a new car. Some of the factories had been destroyed during the war but cars were not built by just one company even before the war. Most parts that went in to cars had been built in Asia, Latin America and Europe. Auto America, Inc was formed. Crews were dispatched around the world to find the machines that had built parts for automobiles. The machines necessary to build a small station wagon were located, dismantled and moved to California. A new factory was built in what had been Orange County. Within three years, while the space ships were still on the drawing board the first new cars in almost 100 years began to roll off the assembly line. Dealerships were set up in all the major cities of Earth and even one dealership in Island City, Arton to market and service the cars. To simplify production and turn out as many as possible as quickly as possible, no changes were made in the hundred year old plans, there were no options offered and they were all painted off white. Within a year the plant was producing almost one thousand cars a day and they were all paid for in full before they were even built. In subsequent years Auto America offered more models, more color choices and more options. Three years after Auto America rolled their first car off the assembly line Detroit Auto Company began making

and selling pick up trucks. A new company in Arizona began building and marketing big rigs, the eighteen wheelers which there was also a critical need for. All of these vehicles required tires, in fact the tires on the vehicles that the first Earth colonists found had just disintegrated after a little use. The Government had started manufacturing tires at a plant in the former Tijuana within two years of the landing of the first colonists. The Government sold the plant to one of the first corporations formed. Since that time the plant had tripled in size and a second plant had been opened in Eugene in the former state of Oregon.

All in all, not only Earth but also on Mars and Arton there was a critical labor shortage. Many people were holding down two jobs some were working twelve hour days. Colleges and Trade schools were graduating people in half the time that it took to train people before the catastrophe. Everything seemed to be running twenty four -seven. They only took time off to get married, have babies and bury the dead.

CHAPTER – The wealth of the Former Residents

When the people of Earth Died off most of them left behind the trappings of the things that represented wealth in their society. It is interesting to note that many people who knew that their fate had been sealed and they had only a short time to live spent a good deal of that time in protecting their valuables. They put valuables in safes, safety deposit boxes and on occasion just took them out and buried them. The new people exploring the old cities almost never found rare coins or jewels, just lying around. This presented a real problem for the people of the new society.

Most people realized that such items had no value but they still could now resist picking up a shiny piece of jewelry or a coin for that matter. Many people made a hobby of scavenger hunting or breaking into old safes and strong boxes and removing the contents. As time went by and the new population fanned out around the globe it became more and more difficult to find such items. They generally used welding equipment to get into safes and extract the contents. The items themselves gradually regained some value and people began using them for barter.

One of the mathematicians calculated that if there had been twelve Billion people and they had each had an average of one hundred items of treasure there would be twelve hundred billion formerly valuable items left on the planet. An average of two thousand six hundred items for every person now on the Earth. That did not count the coins that were in common circulation. Since they were being disproportionately allocated to the people that sought them out many people soon accumulated tens of thousands of these trappings.

This is the idea that finally emerged. People were allowed to keep any of

them that they wanted to keep. But a committee was empowered to assign a credit value to each item or type of item and almost ten thousand workers were trained as appraisers. Anyone who turned in such items to a central collection point would be awarded the appraised value of the item in additional credits to their accounts. These valuables would then be placed in the vaults of Fort Knox with all the gold that was found there.

Under this system a one ounce gold coin was accepted for five hundred credits. Diamonds would bring about one thousand credits per carat. Some people started making an effort to locate these items and turn them in others made an effort to find them and keep them for a rainy day while others just ignored the whole proposition. Most elected to just turn in the things they found but didn't go out of their way looking for them. One faction looked at as robbing the dead and wouldn't even pick an item up if they came across it.

At Fort Knox finished jewelry was kept in one location, rare coins in another, finished diamonds in another and gold coins in another. As fewer and fewer items flowed in prices paid rose and the barter value of these items within the economy rose proportionately. Eventually the Government opened Jewelry stores and offered these items for sale to the public. Engagement and wedding bands proved to be very popular.

In this way a planetary reserve was built up and whether the Government realized it or not the credit's became backed by the Planetary reserve at Fort Knox. This made a lot of people feel more secure knowing that their accumulated credits were backed by something.

For the sake of convenience ordinary minted coins were eventually put back into circulation and were sold by the Treasury at the rate of one credit for one dollar in change. Foreign coins not minted by the United States were never put back into circulation but were sold by the jewelry stores, for a nominal price, as souvenirs. Most of the paper money was discriminating but what when sound paper money was found choice specimens were preserved to eventually be displayed in museums. The coin supply lasted for almost two hundred years before the coins became so worn that they were no longer recognizable. At that point the Government started minting new coins in the same denominations but of a new design.

CHAPTER – Medical Care

The Government maintained a network of free medical care facilities. There was one at or near every school. They were all staffed by five full time people and were always open with one or more of the people on duty. Anyone who felt sick or had sustained a minor injury could go to a local clinic and receive free medical attention on a first come first served basis. If the person

on duty at the clinic could not solve the problem then the citizen was given a slip authorizing him to make an appointment at a regional clinic. If the regional clinic which was staffed by Family Practice MD's could not solve the problem then the person was referred to one of the local Medical Schools, hospitals or specialists.

If the person did not choose to go this route he was free to make an appointment with any medical practitioner or facility that he wanted but when he did this he knew that he would be charged for the service. Soon there were private health Insurance companies offering coverage for a fee to any person that wanted it. They all had different coverages available for a different fee. Most people used the free public health care system.

There was also a free preventative health care program for people over fifty where they were entitled to an annual physical examination and follow up care once a year for routine cases otherwise as often as the primary health care provider dictated.

Medication was all manufactured directly by the Government and provided to the people as a free service.

CHAPTER – Taxation in the new order

The Government implemented the fairest of all possible tax systems. They simply credited the accounts of people and firms that they owed money to. This, you would think, would have the effect of eroding away the value of credits but it never seemed to have much effect on the value of credits. If a person had more credits accumulated in his account than he had immediate need of he could transfer the surplus to a bank that would pay him interest on those surplus credits. The bank, in turn would loan those credits out to worthwhile borrowers at a higher rate of interest than they were paying the depositor. The individual that was seeking a greater return on surplus funds than the bank was offering could transfer the surplus credits to a corporation that was soliciting additional funds for expansion. In return the corporation agreed to pay the investor a prorated share of the profits of the corporation if any or a prorated ownership in the corporation but not necessarily in corporate management.

Large Government issued contracts for goods and services, in excess of one million credits had to be approved by a Government watchdog committee. If the committee was not one hundred percent in favor of the proposed expenditure then the Government had the opportunity to modify the request. If an impasse developed between the Government and the committee both sides would be given the opportunity to present their side of the issue on public Television before the matter was put before the voters.

Though there was no executive or legislative branches of Government there was an active civil service headed by a civil service commission. The

Government then pretty much amounted to the civil service commission who were chosen in the same way that the Supreme Court was chosen.

The Civil Service Commission ran the General Accounting Office, the Department of Public Safety, The Department of Public Records and a number of other public agencies.

The General Accounting Office not only had charge of posting and transferring credits but were oversaw the Securities Exchange Commission, that kept an eye on the Corporations, and the Planetary Deposit Insurance Corporation that kept an eye on the banks

The General Public could challenge the actions taken by any agency. In some cases by circulating a petition and in other cases by filing a civil action.

There was a lot more to the Government than that but the system worked.

CHAPTER – The Criminal Justice System

There was no capital punishment. The entire justice system was dedicated to criminal reform and behavior modification. In most cases the punishment fit the crime. Community Service rather than Incarceration was the customary penalty for violations of the Criminal Code. Probation was the custom. The worst violators, the absolute Incurables were sedated, put on a shuttle and dropped off at some remote location thousands of miles from the United States. When they awoke they had no idea where on Earth they were. They were told that if they ever showed up in the United States again they would be put on Moon Base. There had been a special section of Moon Base walled off. Tasteless food powder and running water but only one gallon per day would be provided, inmates would have an air mattress, a blanket and a toilet but nothing else. No one had ever sent to Moon Base. Most convicted criminals just did their public service, followed the advice of their counselor and their probation officer. They attended the mandatory classes and tried to put the matter behind them. If they had been unskilled they were taught a marketable skill and placed in a paying job where they could apply that skill.

The Government ran trade schools that taught useful skills to all unskilled workers that wanted to better themselves. No one needed to live in substandard housing. Everyone was entitled to a Government job that paid the minimum wage. Even people who were pertinently confined to bed had the job of lying in bed and received the minimum wage. If anyone ever refused to do any work at all they were removed to Catalina Island where they were provided with tasteless powdered food they could remain there until they notified authorities by phone that they were seeking employment.

PART V

CHAPTER Four Thousand years later.

January 1, 6385: Four Thousand years had passed since the arrival of the refugees from Dedov. The planet Earth had become a virtual paradise. There had not been a war on Earth since the holocaust. There had not been a battle fought. Hardly anyone on the planet could be identified as being from any but the same race. The population of Earth was approaching five Billion. There was one nation and one language. They had devised an entirely different system of government, economic organization, production and distribution. Most people were happy with the way the system worked because it worked for everyone.

January 10, 6385: One lone ship materialized in Earth orbit. The commander identified himself as Commander Whigl of The Intergalactic Association of Civilized Planets. "People of Earth,"he began "We have been observing your progress carefully over the last forty Earth centuries. Our Supreme Council has carefully considered all aspects of your civilization and come to the conclusion that you are now ready." He then extended the invitation to Earth to join the Association as a probationary member.

Recent article from University of Washington

University of Washington -- A new means of propelling spacecraft being developed at the University of Washington could dramatically cut the time needed for astronauts to travel to and from Mars and could make humans a permanent fixture in space.

In fact, with magnetized-beam plasma propulsion, or mag-beam, quick trips to distant parts of the solar system could become routine, said Robert Winglee, a UW Earth and space sciences professor who is leading the project.

Currently, using conventional technology and adjusting for the orbits of both the Earth and Mars around the sun, it would take astronauts about 2.5 years to travel to Mars, conduct their scientific mission and return.

"We're trying to get to Mars and back in 90 days," Winglee said. "Our philosophy is that, if it's going to take two-and-a-half years, the chances of a successful mission are pretty low."

Mag-beam is one of 12 proposals that this month began receiving support from the National Aeronautics and Space Administration's Institute for Advanced Concepts. Each gets \$75,000 for a six-month study to validate the concept and identify challenges in developing it. Projects that make it through that phase are eligible for as much as \$400,000 more over two years.

Under the mag-beam concept, a space-based station would generate a stream of magnetized ions that would interact with a magnetic sail on a spacecraft and propel it through the solar system at high speeds that increase with the size of the plasma beam.

Winglee estimates that a control nozzle 32 meters wide would generate a plasma beam capable of propelling a spacecraft at 11.7 kilometers per second. That translates to more than 26,000 miles an hour or more than 625,000 miles a day.

Mars is an average of 48 million miles from Earth, though the distance can vary greatly depending on where the two planets are in their orbits around the sun. At that distance, a spacecraft traveling 625,000 miles a day would take more than 76 days to get to the red planet. But Winglee is working on ways to devise even greater speeds so the round trip could be accomplished in three months.

But to make such high speeds practical, another plasma unit must be stationed on a platform at the other end of the trip to apply brakes to the spacecraft.

"Rather than a spacecraft having to carry these big powerful propulsion units, you can have much smaller payloads," he said.

Winglee envisions units being placed around the solar system by missions already planned by NASA. One could be used as an integral part of a research mission to Jupiter, for instance, and then left in orbit there when the mission is completed. Units placed farther out in the solar system would use nuclear power to create the ionized plasma; those closer to the sun would be

able to use electricity generated by solar panels.

The mag-beam concept grew out of an earlier effort Winglee led to develop a system called mini-magnetospheric plasma propulsion. In that system, a plasma bubble would be created around a spacecraft and sail on the solar wind. The mag-beam concept removes reliance on the solar wind, replacing it with a plasma beam that can be controlled for strength and direction.

A mag-beam test mission could be possible within five years if financial support remains consistent, he said. The project will be among the topics during the sixth annual NASA Advanced Concepts Institute meeting Tuesday and Wednesday at the Grand Hyatt Hotel in Seattle. The meeting is free and open to the public.

Winglee acknowledges that it would take an initial investment of billions of dollars to place stations around the solar system. But once they are in place, their power sources should allow them to generate plasma indefinitely.

The system ultimately would reduce spacecraft costs, since individual craft would no longer have to carry their own propulsion systems. They would get up to speed quickly with a strong push from a plasma station, then coast at high speed until they reach their destination, where they would be slowed by another plasma station.

"This would facilitate a permanent human presence in space," Winglee said. "That's what we are trying to get to."

University of Washington

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