Blood Moon

Colin Matthews woke to the first soft tone of the base time signal. As he did so, the wall panels of his sleeping zone began to glow with a pale-yellow light.

He had been at the Virgin Space X Lunar Station for just under a month and was becoming used to the routine. He had not yet got over the excitement of just being there and this excitement was growing by the day as the big event approached.

Colin was a 32-year-old agronomist, with a PhD from Exeter University. When the lunar station had been set up in 2027, he had applied, rather speculatively to join its staff. His appointment signalled the start of the greatest adventure of his life.

At University he had been a more or less diligent student, with the usual streak of youthful rebellion. His interest in the cultivation of ‘pot’ plants had, ironically, led to PhD research into hydroponics. This had been the foundation of his selection for the team, as plant protein, grown with minimal irrigation, combined with mineral supplements extracted from the lunar regolith material, were fundamental to the long-term diet of the base occupants.

The Virgin Space X Lunar Station One had several functions, perhaps the most important being the demonstration of the feasibility of long-term survival in a space environment, as a precursor to missions to other bodies, such as Mars and the moons of the Jovian planets.

The station itself was mostly semi-buried beneath the lunar surface, composed of a gritty dust-like mineral substance known as regolith. It was located on the edge of Shackleton Crater near the moon’s south pole, selected because of its “moderate” temperatures, between –45 degrees C and 10 degrees C.

Shackleton Crater also has the important advantage of being in sunlight — albeit weak sunlight — for up to 80 percent of the year, sunlight being crucial for the generation of electricity. If the base had been built at the lunar equator, it would have been in darkness for half of every month and subjected to much more severe temperature variations.

The Lunar Station was established in 2025 and had several specific objectives.

The staff induction briefing had listed these, as follows:

* Investigation of science and technology for sustaining life in planetary environments
* Fundamental science, bio-science and engineering research related to low gravity environments
* Establishment of a construction and launch facility for manned spaceflight assemblies to enable exploration of other planets and moons – with Mars as the first target.
* Exploration and exploitation of lunar minerology.
* Generation using lunar materials to the greatest extent possible of gases to support life and rocket propellants.
* Investigation of the influence of lunar dust and grit (regolith) on mechanical / survival systems.
* Support to space tourism (partly to garner political and public support by demonstrating the maturity and normality of space travel and partly to help cover the on-going running costs of the station).

Although regolith as a gritty dust makes life complicated by wearing down seals and causing premature failure of mechanical joints and mechanisms of all sorts, it is also a key to survival. Forty-two percent of regolith is oxygen. Extracting this to make breathable air, and further chemistry to create rocket fuel, water and key minerals was the basis of long-term survival at the Lunar Station.

Because of the range of skills required on site, a significant number of staff were required. This implied the use of ‘ordinary’ scientists and engineers, rather than the selection of astronauts from a narrow spectrum of military test pilots, that had characterised the Apollo programme, back in the 20th century.

The base was still at an early stage in its development and yet mature enough for its real dangers to have become largely masked by routine.

It was currently occupied by around 40 personnel, mostly American and mostly male, with a long-term plan to grow to at least ten times this figure over the next 20 years.

The station consisted of a series of habitable radiation-shielded structures, which were covered with a thick layer of regolith ‘render’, which served both as thermal insulation and as a radiation shield. These structures were partially built into the walls of the crater, like opal miners’ dwellings in Australia. A number of smaller structures were used for the growing of hydroponic crops under artificial light and heat.

In addition, there were communication dishes, fuel storage facilities, a power generation site and a landing site for supply and tourist ships, which are also used for crew rotations and the delivery of spare parts and other stores. Automation and robotics support the limited staff and help to provide for the safe operation of the base.

26th June 2029 was The Day – today there would be a lunar eclipse, with totality lasting nearly two hours.

Whilst a student, Colin’s and his circle of friends had taken an interest in alternative beliefs, to go along with their somewhat alternative life style. He had become interested in legends surrounding sun and moon worship and the portents surrounding eclipses in particular.

He knew that the Egyptians worshipped Ra, the sun god, as the giver of life and that the Incas believed that the red moon during a lunar eclipse was blood flowing over the surface of the moon as it was eaten by a giant jaguar. The Mesopotamians had a similar myth, but blamed a gang of seven demons for the assault on the moon. In Togo and Benin, the red moon resulted from a fight between the sun and the moon and only ceased when the combatants settled their differences.

Colin had seen several lunar eclipses from the Earth and was now secretly obsessed by his ability to experience a total lunar eclipse from the moon’s surface.

The Station rules barred solo moon walks for safety reasons, but Colin was confident that this would not be a problem. ‘What can possibly go wrong?’ he thought.

His work in the hydroponics zone was assisted by two junior staff. As the eclipse started, Colin complained that he was getting a migraine and asked the juniors to carry on with their duties, while he returned to his rest zone to recover.

On his way, he stopped to pick up his protective suit and survival equipment from its storage location.

It took him 25 minutes to put on the suit and test the breathing and environmental control systems. He disconnected the radio antenna, reasoning that he couldn’t then be told to return inside the protected zone until he was ready to do so.

The external monitor screen showed him that the lunar landscape was changing colour to a deep reddish-orange. Picking up his camera, he moved towards the airlock that controlled the lunar surface exit from the semi-buried hydroponics area.

The air lock had two compartments. There was an inner door, leading to an inner chamber. The routine was to enter this chamber and secure the inner door. Once this was done, the safety interlocks allowed a second door to be opened to the outer exit chamber.

He was supposed to close this door before exiting. In his hurry not to miss the total eclipse, and hampered by his camera and tripod, he pushed the door closed, but did not operate the full locking system.

He realised his mistake only as he opened the outer door. The pressure behind the inner door caused it to swing open, rapidly dropping the pressure in the inner chamber.

He saw, rather than heard, the alarms go off. As he stepped outside, the zone safety systems swung into action, closing and locking both doors behind him. He remembered that the system would then operate a time lock and prevent him from entering until this had cleared.

There was also a special procedure for externally opening the door, once the time lock had been triggered. He couldn’t remember the process, but he knew that the instructions were given on the outside of the door.

‘Oh, well’ he thought ‘that wasn’t very clever. I’ll sort it out later’.

He moved off to get a perfect view of the earth, just as the moon entered the earth’s umbra into total eclipse. With the camera set up, he began taking a series of spectacular photographs.

The earth, instead of shining its familiar blue, with white cloud patterns, was now a black disc against the impenetrable blackness of space, but surrounded by a deep red ring, paling to orange and yellow. The entire globe was simultaneously surrounded by the most spectacular sunset.

Totality was due to last one hour and forty-two minutes, but after half an hour he was beginning to feel guilty and headed back to the entry door.

Arriving there, he was shocked to find that there were no instructions on the correct emergency opening procedure. He tried the normal procedure and nothing happened. Perhaps the time lock was still in place.

He tried to reach the radio antenna connections, but he found it difficult when wearing the suit. With an effort he could reach the connection but could not get the two halves to mate properly, whilst wearing his protective gloves.

He was beginning to panic and breathing heavily now. One last heave might do it …

There was a sudden crack, a deafening rush of air and everything went black.

Back on Earth, the news media swung into action

“News is coming in of an incident at the Virgin Space X Lunar Station. We will bring this to you as soon as we have more detail.”

The picture slowly emerged until a sombre-faced US Government spokesman announced, ‘We regret to announce the death of an employee at the Virgin Space X Lunar Station One during an unauthorised excursion onto the lunar surface’.

The subsequent Board of Enquiry regretted that more attention had not been paid, during the staff screen process, to Colin’s slightly rebellious nature when a student. It was concluded that he had panicked when unable to operate the door system. Had he calmed down and waited, he would have been recovered without incident and would merely have faced disciplinary action.

His disabling of his radio communications was a contributing factor, as was his decision to travel alone on the lunar surface.

A further factor had been the failure of a seal in the arm articulation of his suit, that had been damaged by the wear caused by the ingress of small amounts of abrasive regolite lunar dust.

Critically, and despite their regular occurrence two or more times per year, the hazards associated with a total lunar eclipse had failed to be recognised. In particular, the emergency entry instructions would now be provided in black lettering against the white background of the door surround.

The previous lettering had been in ‘Dayglo’ orange and it had been realised, during the investigation, that this would be very likely to have been rendered invisible, in the lighting conditions of a total lunar eclipse.

Colin Matthews name has entered the historical record as the first human to lose his life at a space settlement.

Popular sentiment agrees that the cause of his death was the Blood Moon.

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