

Earth → Moon : Kate's Journal, 3000 A.D.

First launch of the new millennium, and you'd never know it from the pad.

No thunder, no smoke, no crowds. Just a clean bowl cut into the basalt, rimed with frost and silence. They say the basin took thirty years to carve — a crater built by men who never left Earth so the rest of us could. Nothing drips, nothing burns; every gram of exhaust is caught and cooled before it escapes. I used to think that was over-engineering. Now I call it decency.

Boogie's already at the panel, sleeves rolled, humming that old tune about the river and the boat that wouldn't quit. The engines light and the deck trembles like a big cat stretching. Blue flame, no smoke. Three g steady; it presses the years out of your spine.

The sky goes thin, then black, and the sea folds itself small behind us.

That's the part that always gets me — the clean break. For two minutes the noise is everything, and then it's gone. Just heartbeat, fans, and the faint buzz of a world receding.

I check the crew roster. Eight souls, all familiar. Some fresh burns on the rookies from their last shift; they'll scab over by orbit. My job's the same as ever: keep the body working, keep the mind from unthreading. I'm doctor, shrink, and cranky aunt rolled into one. Boogie calls it "herding comets."

The captain's voice drifts down the corridor — real, human, gravelly. No synthetic calm today; the AIs still answer, but they don't command. That was the deal we struck a century ago: machines may fly the ship, but people steer the voyage.

The transfer tug waits for us up-track, silver and serious. She's got a belly full of methane and a heart of uranium, humming gentle behind a curtain of radiators. I used to flinch at the word *reactor*; now it's just another sound of life — steady, contained, polite.

When we dock, the old satellite drifts past the viewport, still circling after a thousand years. TEL-SAP 1, or what's left of it. Boogie points it out, laughs. "All that for a picture show," he says. The crew chuckles. A bus-sized relic for a world that once thought orbit was forever. Now it's just another bead on the string.

Then comes the kick — the Oberth burn. You don't hear it so much as feel it, a deep shove that rearranges your organs. The tug throws us toward the Moon, and Earth tilts away like a lamp being dimmed.

After that, it's quiet again. I float to the galley, strap in, make the rounds. Reyes is pale; first trip since the accident last rotation. I crack a joke, she almost smiles. Boogie floats by with a wrench between his teeth, muttering at a valve. I swat his boot. He grins. Same old dance.

Three days to lunar orbit. Enough time for the body to forget weight, for the mind to start missing gravity's hug. I write these lines in the med bay, watching the monitor trace our pulse — eight hearts, one rhythm, stitched to a metal hull sliding through vacuum.

We're not heroes. We're commuters in the long climb, the thousand-year migration from cradle to sky. But I like to think we do it right — no waste, no poison, no lies about what it costs. We burn clean, we keep the leaks sealed, we carry our own ghosts.

Boogie drifts in, points at the Moon ahead, bright and near.

"Home shift," he says.

"Home," I answer, and log off.

Lunar Approach : Kate's Journal, 3000 A.D.

We meet the lander on the night side, where the darkness is honest and the stars don't blink. She comes up under us like a steel lily—broad petals of radiator fin, squat tanks, nose blackened a little from a thousand polite landings. The docking collars kiss; the tug peels away, already sniffing its next job.

The Moon fills the forward glass. No blue here, no weather to hide mistakes—just stone and sunlight and the shadows that keep their word. We light the transfer burn and slide down toward LLO. Boogie hums again, syncopated with the thruster pings. You could set a metronome to this ship.

Descent starts like a secret: a whisper of thrust, a change in the way loose things float. Then the floor puts its hand under your boots and you remember you weigh something after all. One-sixth. Good for the joints, tricky for the pride.

Our pad glows on the horizon—three rings of beaten-bright regolith, sintered to glass, cut by a trench that swallows exhaust and spits it sideways into a capture pit. The perimeter fences crackle faintly, a curtain of static to catch the spiteful dust that wants to ride the plume into everything you love. We learned that lesson early. Now the pad wears its scars like medals and keeps the rest of the base clean.

"Two hundred meters," the captain says, voice low. "Feathering main. Stand by on plume shields."

I watch the needles, and the crew, and the gray plain rolling slow beneath us. Reyes is steady now. My hand hovers near her shoulder anyway. Old habits.

"Fifty." The engines deepen, a note you feel in the molars. The trench eats the fire; side vents throw the heat off into the pit where the radiators drink it down and send the waste to the black where it belongs.

The hull settles like a sigh. You don't cheer on the Moon. You don't jinx a landing. You just breathe and let your heart find its level.

Pad sealed. Dust count nominal. The pumps begin their tidy racket, hauling any stowaway grains into the traps. I bring up the environment board: oxygen yards ticking along, electrolyzers drawing a thin red line through local rock and turning it into air and oxidizer. Each tank a month the Earth doesn't have to carry for us. That's the quiet miracle out here—breathing your surroundings without dirtying them.

We unstrap. The lander smells like clean metal and work, same as always. Suits off the wall, not through—suitports. You clip in, backplate to hatch, and the vehicle and vacuum do the rest of the handshake. Dust stays where it belongs: outside, under the Sun that made it sharp.

Boogie thumps his glove against mine. "You talk to your ducklings," he says. "I'll go sweet-talk the condenser loop." His eyes have that grin they get before a fight with a stubborn pipe.

I ping the squad. Eight green lights. Eight voices. Quick checks, dry jokes, one quiet confession that the last reentry dream came back last night—ocean, fire, the usual ghosts. I log it, breathe with him for thirty seconds, make a plan for later. He thanks me like we traded coffee instead of courage.

The hatch opens on a slice of gray noon. Shadows cut like knives. We step out in pairs, boots biting the sintered pad, umbilicals trailing. The base sits low and mean—half-buried domes, regolith blankets like snowdrifts, antenna masts notched against the glare. A hundred meters out, the oxygen yards tick and hum, vats fat with molten rock, bright as devil glass. The radiators beyond them glow in a way you feel in your teeth.

There's a new scuff on the south fence; some micrometeor had its say while we were planet-side. I log it, wave the maintenance crew that direction. Plumes and dust, micromets and heat—those are the four horsemen out here. Keep three out and make the fourth pay rent.

We march the cargo cradle to the hatch—medical kits, filters, two crates of printed valves, and a string of small tanks that jingle faintly when you move them. Lunar oxygen, first cut, going up next cycle. You get used to carrying fuel that tastes like the ground you walk on.

I peel off to the med bay to wake the machines and run a baseline—radiation badges, hematology, the little cognitive tests that catch an unraveling mind before the owner does. The numbers come up like dawn. Clean, clean, almost clean—Boogie's vitals spike where he's arguing with the condenser, then settle when he wins. I add a note to kiss him for science.

Shift two takes the pad. We close the trench shutters, cycle the capture pit scrubbers, and let the static fences crackle themselves smug. I stand a minute on the threshold and listen. The Moon doesn't have weather, but it has a mood. Today it's the sound of pumps far away and the click of dust against mesh. I grew up with surf. This is better.

Night will come in a week. The stars will get so bright you'll swear you can hear them. But for now it's high day and there's metal to coax and people to keep whole.

I swing by the yard. The new electrolyzer stack looks fat and honest. We've crossed twelve tons O₂ per month. That's twelve tons the Earth didn't have to lift, twelve tons we don't have to apologize for. Hydrogen still comes up with the crew, shy and expensive, but the ice prospectors radio good news every quarter now. One day the tanks on this hill will be Moon-born end to end, and somebody will complain the oxygen tastes like local basalt, and I'll tell them to have a glass of gratitude.

Boogie finds me with dust on his visor and that cat-who-ate-the-canary look. "Loop's humming like a hymn," he says. "Tell your ducks they'll get hot showers till Wednesday."

I log the win and walk the line—hab, yard, comms, greenhouse. Little eucalyptus trees tug at the light; lettuce curls like green fists. The greenhouse is a rumor of wet in a world of dry. I stand there too long, and the captain taps my shoulder on the net. "Kate," he says, "you want to call shift meal or marry those lettuces?"

"Jealousy doesn't suit you," I tell him, and head for the table.

We eat together. We always do, first night back. The rookies are quiet, pretending not to watch the veterans eat. Boogie rips his bread with that slow sailor's care he has and slides me the bigger half. We swap stories you only tell to people who've seen the same sky.

After, I make the rounds again. A knuckle taped, a valve checked, a nightmare name learned. I stand in the airlock a minute and listen to my own breath, let it fog the visor, watch it clear. On Earth they talk about silence like it's a lack. Here it's a presence. You can lean on it.

I log the day. First entry of the new millennium's first crew shift. The pad held. The trench caught the fire. The fences drank the dust. We burned clean, and came down kinder than the generation that taught us how.

Boogie leans in the doorway, helmet under his arm, face cut in half by shadow and light. "You still want this?" he asks, same as he asked on my first landing, same as he'll ask on my last.

I look past him at the gray plain and the glittering yard and the tiny blue coin rising slow over the ridge.

"Every time," I say.

He nods, taps the doorframe twice for luck, and we go to tuck our people in for the long bright afternoon.

Act III — The Accident : Kate's Journal, 3000 A.D.

It started with the hum.

Every machine on the Moon hums a little, but this one was wrong—too tight, like a wire about to snap. I felt it through the soles of my boots before I heard it.

We'd been running the oxygen yard hot all week, cycling regolith through the new electrolyzer array. The numbers were beautiful—ten percent over projection—and Boogie, damn him, was already talking about naming the next tank after me. "Saint Kate of the Clean Burn," he said that morning. I told him to go scrub his halo.

Then the hum changed pitch.

"Loop Three pressure drop," Reyes called from the console. The gauge was sliding fast. I was halfway across the bay when the first warning light bloomed scarlet.

Then—silence. No bang, no roar, just that cold, bone-deep quiet that tells you something enormous has happened and the sound hasn't caught up yet.

I hit the intercom. "Seal the yard. All hands in suits."

The deck tilted. Dust came through the lighting vents like smoke underwater. A plume burst from the electrolyzer's cooling stack—bright, white, wrong. The vent hadn't failed; the *pipe* had. Super-heated oxygen met aluminum and decided to get biblical.

I saw Boogie go down under a falling conduit. No fire, thank God—there's no air for it—but the heat was savage. I was already moving, suit-seals half-latched, yelling for the med pod to spin up.

By the time I reached him, his sleeve was black glass. The smell was metal and ozone, not blood. "Stay still," I said. "You'll keep your arm if you let me work."

He grinned through the faceplate, teeth red in his lights. "You always promise that."

Reyes and Chen were on the valves, shutting down loops one and two before the heat could climb. The captain's voice came flat and calm over the channel, the kind of calm that only shows up when you're one step

from panic. "We've got containment breach potential in the yard. Ten minutes to safe pressure if the secondary holds."

"Copy," I said, though I didn't believe it.

I cut Boogie's suit away with a sterile blade, packed the burn gel, and hooked his IV to the portable recycler. He tried to sit up; I pushed him down. "I'm still prettier than the pipe," he muttered. I laughed, because that's what you do when you can't cry in a helmet.

The heat alarms went yellow. The secondary loop was holding—for now. We had to vent the yard, dump half our month's oxygen into space, or lose the whole plant. The captain's eyes found mine through the visor glass. I nodded. He hit the purge.

The sky outside turned white, a ghost aurora sweeping over the base as thousands of liters of oxygen roared into vacuum. For a heartbeat, it looked like the Moon had grown an atmosphere again. Then it was gone.

We crouched in the lock and listened to the pressure gauges crawl back to zero. The hum was gone now. Only the ticking of cooling metal and our own breathing.

Two hours later, the firewatch drones confirmed the yard was cold. The captain gave the all-clear. I set up the med rig in the hab, stripped Boogie's suit the rest of the way, and saw what we'd kept. He'd live. The burns were deep but clean. The worst was shock, and pride.

I sat with him through the lunar night. He dozed, muttering half-dreams of rivers and smoke. The others came in quiet, one by one, carrying salvage. Reyes's face was gray under the dust. Chen's hands shook. I gave them work—inventory, triage, anything to fill the silence. That's the trick: don't let the stillness win.

When the shift's log time came, I opened a new entry.

> **Incident Report, 0300 hours, 3000 A.D.**

> Loop failure in Yard Three. Structural fatigue from micro-impact, undetected by scan. One injury, stabilized. Oxygen loss: 48%. System integrity: 72%. Crew: unbroken.

Then, softer, beneath it:

> We came here to learn how to live clean. The universe reminds us it can still kill clean, too.

> Fire without flame. Dust without mercy.

I looked over at Boogie, pale but breathing. Reyes was asleep at the console. Outside, the crater shone like glass in the Earthlight.

I wrote one more line before sealing the log:

> "We hold because we hold each other."

You can hear the tension stretch there, Hugh—the mechanical threat, the physical heat, and the quiet aftermath where Kate's competence and humanity pull the crew back from unraveling.

Want the next act to pick up *after the emergency rotation*, when command recalls them Earth-side for debrief and Kate has to decide whether she'll go back up—or shall we stay on the Moon for the rebuilding scene?

Act IV — Emergency Rotation : Kate's Journal, 3000 A.D.

There was never a question. Boogie was going home, and so were we.

By dawn—lunar dawn, a blade of light crawling down the crater wall—the med cradle had him bundled like a ship's bell, shock-warmed and plumbed into the evac pod. I'd done what I could: cooled what would keep, wrapped what wouldn't, argued with the numbers until they blinked first. The scans told a blunt story—rib ladder cracked in two places, a wrecked shoulder, deep burns where the sleeve turned to glass. If he keeps the arm, it'll be because he's stubborn and the surgeons are saints.

I sealed the last dressing and kissed his forehead through the visor rim. He blinked awake, pupils huge in the gray. "No fuss," he said. "Tie me to the mast and point me downstream."

"You're cargo," I told him, voice steady. "I'm your label."

The captain didn't have to ask; he just nodded. Emergency rotation protocol pulled us like gravity: *Humanity First*. It's not a motto on a flag. It's the reason we built the basin and the trench and the fences; the reason we count molecules and capture heat; the reason we come home when one of us can't stand unassisted. We don't leave people behind to make the numbers pretty. We are the numbers.

Ops sent the relief crew on a fast transfer the minute our incident ping hit Earth. Twelve hours later their beacon crested the limb, a cold star falling fast. We could hear their breathing on the loop as they matched orbits—new voices, same cadence. The Moon teaches you to clone courage.

While the tug prepped the evac burn, I ran the reports. There's no romance in them, just the architecture of conscience.

Pollution Report — Yard Three:

* **Mass lost to purge:** 21,480 kg O₂ (48% of monthly stock). Dispersed to vacuum via designed vent stack; no surface frost detected beyond plume corridor; no measurable albedo change.

* **Particulate release:** zero external—capture pit contained all macro-fines; static fences trapped microns; post-event sweep collected 312 g of residue. Logged and sealed.

* **Thermal signature:** peak radiant flux within predicted envelope; radiators dumped excess in 17 minutes. No habitat heat ingress.

System Failure Report — Root Cause:

* Micro-meteoroid strike on cooling manifold segment L3-17, below scan resolution at last maintenance. Impact generated subsurface crack; thermal cycling propagated flaw; final failure under peak load.

* **Contributing factors:** yard running 10% hot for six days; inspection cadence not adjusted; scan threshold for that segment class too coarse by one order of magnitude. That one's on me. I wrote it cold.

Growth Plan — Immediate:

- * Double scan density on all coolant manifolds; add acoustic emission sensors to catch subsonic crack growth.
- * Lower yard throughput to nominal until new metallurgy panels installed.
- * Add redundant shutoff at each electrolyzer throat; move loop pressure reliefs nearer to heat source.
- * *Personnel:* rotate crews through micro-micromet drills until they can do them backwards in their sleep; add “hum signature” catalog so the next Kate hears the wrong note sooner.

I attached Boogie’s vitals and my notes to the packet the way you tuck a photo into a letter you hope gets read. Then I filed the *Human Factors* addendum—the one the books pretend is optional.

****Human Factors:****

- * Reyes: silent, steady, delayed tremor two hours post-event; counseling plan initiated.
- * Chen: overcompensation via work; reassign to light duty 48 hours to interrupt the spiral.
- * Captain: flat affect masking strain; flagged for peer check.
- * Kate: sleeps when cornered; recommend more corners.

By the time the relief crew’s lander kissed the pad, our yard gleamed like an operating room that survived its patient. The new team disembarked with the kind of quick respect you only see in places that can kill you without a fuss. We shook hands helmet to helmet—glove taps, nods, the small ritual that swaps custody of a patch of Moon without a speech.

“Her name’s honest,” I told their chief, palm on the electrolyzer casing. “She’ll do what you ask if you watch her eyes when she lies.”

He grinned. “We’ll read her pupils, ma’am.”

We loaded the evac pod last. Boogie was light as a rumor in the cradle, all angles and tubing. I strapped in beside him for launch and the captain took the opposite rail. The others filed past, touching the cradle once each—knock, knock—for luck. We’re old-fashioned like that. We believe in metal and knuckles and the way a good ship sounds when you ask her to rise.

The tug took us up on a thread of thrust, no waste, no drama. Below, the relief crew set to work—their suits small against the scale of the yard. The pad shrank to a silver coin, the trench a neat black line through it. I watched the capture pit radiators fade from cherry to coal in the thermal window and felt my jaw unclench by degrees.

We hit the transfer arc and the tug’s nuclear turbines began their long hum. You don’t sleep in that sound; you surf it. Boogie drifted in and out. When he was lucid, he cracked the usual jokes. When he wasn’t, he ran a thumb along the cradle strap like a man checking the edge on a knife.

“Hey, Saint Kate,” he murmured once. “You write down the lesson?”

“Three of them,” I said. “Don’t flirt with throughput. Listen to the hum. Go home when someone’s hurt.”

“Fourth,” he breathed. “Marry a stubborn woman.”

I would have smiled if my mouth would work.

Halfway to Earth, Ops slid in a tightbeam from the base: *Relief crew nominal. Yard cold. Fence repair complete. O₂ production resumed at 60%.* They attached a photo of Reyes's console with a new sticker: a matched pair of angel wings over a wrench. Humor is the cheapest insulation we've got.

On day two, I finished the last of the forms and turned to the thing I'd been putting off: the letter to the kids. Two grown, one still in school, all three possessing the family talent for pretending fear is inconvenient. I kept it simple. Your father is hurt. He is alive. We are coming in. We will fix him. We will go back. Love is a verb.

Orbit rose up beneath us like a hand. The *Ascender* slid free of the tug with the easy arrogance of a ship that has done this since before your great-grandmother was born. We burned the clean burn—methane and oxygen, blue and invisible—and the atmosphere took us back like a mother who knows you'll leave again.

At the sea platform, spray leaped as if trying to meet us. The deck crews moved like they were finishing a ballet someone else started long ago. They've got the same eyes as lunar crews: corners creased by squinting at light that is too honest to argue with.

They wheeled Boogie straight to surgery. The air smelled like salt and iodine. I stripped out of my suit and looked down at my hands, surprised to find them steady. Stubborn, he'd said. Guilty, I corrected.

A liaison tried to intercept me with a clipboard and a plan. "Debr—" he began.

"No," I said, not loud, just true. "Humanitarian first."

He didn't argue. The rule is older than he is.

In the waiting room, Reyes dozed open-eyed; Chen watched a tide chart like it was a vital sign. The captain sat with his hands folded, wedding band bright as a promise. I filed the last packet—*Pollution, System, Growth*—from a terminal that smelled of coffee and disinfectant. Then I closed my eyes for the length of a held breath and reopened the part of me that always feels like med bay night.

Surgical report came out clean as a miracle. They saved more than I expected. Boogie would be ugly, and he'd be ornery about it, but he'd keep the arm's bones and most of its stubborn. Rehab would be long. Good. He's better at long fights.

We checked into the crew quarters that overlook the pad's bowl. Even from Earth, you can see the shape of our choices: the crater's white rim, the traps and drains, the way the builders curved everything to point waste back into our hands. I slept with the blinds open so I wouldn't forget what stewardship looks like in profile.

In the morning, I walked the seawall and dictated the last bit for the log—voice raspy, legs remembering gravity.

> **Emergency Rotation Closure:**

> Crew evacuated per protocol. Patient stabilized and transferred. Relief crew engaged. Yard recovery underway at reduced throughput. New sensors inbound.

>

> **Observation:**

> The system did not fail us. We failed its vigilance by believing a ten-percent win was free. We will not pay twice.

>

> **Directive:**

> Humanity First is not sentimental. It is arithmetic. The only renewable in this equation is courage, and it breeds in company.

I stopped the recording and watched a gull drag a scrap of weed through the air like a banner. In the glass of the terminal, my face looked like my mother's the day she told me not to lie to a storm.

I turned toward the hospital. Boogie would be grumpy by now, and the nurses would already be organizing a betting pool about who'd break first, patient or morphine pump. I planned to cheat and bring him coffee.

We'll go back when he can climb a ladder and curse properly while doing it. The yard will hum the right way. The fences will crackle like a good joke. The trench will yawn and drink our fire and give nothing back but the heat we mean to spend.

There was never a decision. There was only what you owe to the crew who carried you and the ground that let you go.

I'm Kate. I'm the glue. I hold because we hold each other.