

“HELLO, AND thank you for joining us,” Cathy Warner said to the camera. “Today on CNN’s *Mark Watney Report*: Several EVAs over the past few days...what do they mean? What progress has NASA made on a rescue option? And how will this affect the Ares 4 preparations?”

“Joining us today is Dr. Venkat Kapoor, director of Mars operations for NASA. Dr. Kapoor, thank you for coming.”

“A pleasure to be here, Cathy,” Venkat said.

“Dr. Kapoor,” Cathy said, “Mark Watney is the most-watched man in the solar system, wouldn’t you say?”

Venkat nodded. “Certainly the most watched by NASA. We have all twelve of our Martian satellites taking pictures whenever his site’s in view. The European Space Agency has both of theirs doing the same.”

“All told, how often do you get these images?”

“Every few minutes. Sometimes there’s a gap, based on the satellite orbits. But it’s enough that we can track all his EVA activities.”

“Tell us about these latest EVAs.”

“Well,” Venkat said, “it looks like he’s preparing Rover 2 for a long trip. On Sol 64, he took the battery from the other rover and attached it with a homemade sling. The next day, he detached fourteen solar cells and stacked them on the rover’s roof.”

“And then he took a little drive, didn’t he?” Cathy prompted.

“Yes he did. Sort of aimlessly for an hour, then back to the Hab. He was probably testing it. Next time we saw him was two days later, when he drove four kilometers away, then back.

Another incremental test, we think. Then, over the past couple of days, he's been stocking it up with supplies."

"Hmm," Cathy said, "most analysts think Mark's only hope of rescue is to get to the Ares 4 site. Do you think he's come to the same conclusion?"

"Probably," Venkat said. "He doesn't know we're watching. From his point of view, Ares 4 is his only hope."

"Do you think he's planning to go soon? He seems to be getting ready for a trip."

"I hope not," Venkat said. "There's nothing at the site other than the MAV. None of the other presupplies. It would be a very long, very dangerous trip, and he'd be leaving the safety of the Hab behind."

"Why would he risk it?"

"Communication," Venkat said. "Once he reaches the MAV, he could contact us."

"So that would be a good thing, wouldn't it?"

"Communication would be a *great* thing. But traversing thirty-two hundred kilometers to Ares 4 is incredibly dangerous. We'd rather he stayed put. If we could talk to him, we'd certainly tell him that."

"He can't stay put forever, right? Eventually he'll need to get to the MAV."

"Not necessarily," Venkat said. "JPL is experimenting with modifications to the MDV so it can make a brief overland flight after landing."

"I'd heard that idea was rejected as being too dangerous," Cathy said.

"Their first proposal was, yes. Since then, they've been working on safer ways to do it."

"With only three and a half years before Ares 4's scheduled launch, is there enough time to make and test modifications to the MDV?"

“I can’t answer that for sure. But remember, we made a lunar lander from scratch in seven years.”

“Excellent point.” Cathy smiled. “So what are his odds right now?”

“No idea,” Venkat said. “But we’re going to do everything we can to bring him home alive.”

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MINDY GLANCED nervously around the conference room. She’d never felt so thoroughly outranked in her life. Dr. Venkat Kapoor, who was four levels of management above her, sat to her left.

Next to him was Bruce Ng, the director of JPL. He’d flown all the way to Houston from Pasadena just for this meeting. Never one to let precious time go to waste, he typed furiously on his laptop. The dark bags under his eyes made Mindy wonder just how overworked he truly was.

Mitch Henderson, the flight director for Ares 3, swiveled back and forth in his chair, a wireless earpiece in his ear. It fed him a real-time stream of all the comm chatter from Mission Control. He wasn’t on shift, but he was kept apprised at all times.

Annie Montrose entered the conference room, texting as she walked. Never taking her eyes off her phone, she deftly navigated around the edge of the room, avoiding people and chairs, and sat in her usual spot. Mindy felt a pang of envy as she watched the director of media relations. She was everything Mindy wanted to be. Confident, high-ranking, beautiful, and universally respected within NASA.

“How’d I do today?” Venkat asked.

“Eeeh,” Annie said, putting her phone away. “You shouldn’t say things like ‘bring him home alive.’ It reminds people he might die.”

“Think they’re going to forget that?”

“You asked my opinion. Don’t like it? Go fuck yourself.”

“You’re such a delicate flower, Annie. How’d you end up NASA’s director of media relations?”

“Beats the fuck out of me,” Annie said.

“Guys,” Bruce said, “I need to catch a flight back to LA in three hours. Is Teddy coming or what?”

“Quit bitching, Bruce,” Annie said. “None of us want to be here.”

Mitch turned the volume down on his earpiece and faced Mindy. “Who are you, again?”

“Um,” Mindy said, “I’m Mindy Park. I work in SatCon.”

“You a director or something?”

“No, I just work in SatCon. I’m a nobody.”

Venkat looked to Mitch. “I put her in charge of tracking Watney. She gets us the imagery.”

“Huh,” said Mitch. “Not the director of SatCon?”

“Bob’s got more to deal with than just Mars. Mindy’s handling all the Martian satellites, and keeps them pointed at Mark.”

“Why Mindy?” Mitch asked.

“She noticed he was alive in the first place.”

“She gets a promotion ’cause she was in the hot seat when the imagery came through?”

“No,” Venkat frowned, “she gets a promotion ’cause she figured out he was alive. Stop being a jerk, Mitch. You’re making her feel bad.”

Mitch raised his eyebrows. “Didn’t think of that. Sorry, Mindy.”

Mindy looked at the table and managed to say, “kay.”

Teddy entered the room. “Sorry I’m late.” He took his seat and pulled several folders from his briefcase. Stacking them

neatly, he opened the top one and squared the pages within. "Let's get started. Venkat, what's Watney's status?"

"Alive and well," Venkat said. "No change from my e-mail earlier today."

"What about the RTG? Does the public know about that yet?" Teddy asked.

Annie leaned forward. "So far, so good," she said. "The images are public, but we have no obligation to tell them our analysis. Nobody has figured it out yet."

"Why did he dig it up?"

"Heat, I think," Venkat said. "He wants to make the rover do long trips. It uses a lot of energy keeping warm. The RTG can heat up the interior without soaking battery power. It's a good idea, really."

"How dangerous is it?" Teddy asked.

"As long as the container's intact, no danger at all. Even if it cracks open, he'll be okay if the pellets inside don't break. But if the pellets break, too, he's a dead man."

"Let's hope that doesn't happen," Teddy said. "JPL, how are the MDV plans coming along?"

"We came up with a plan a long time ago," Bruce said. "You rejected it."

"Bruce," Teddy cautioned.

Bruce sighed. "The MDV wasn't made for liftoff and lateral flight. Packing more fuel in doesn't help. We'd need a bigger engine and don't have time to invent one. So we need to lighten the MDV. We have an idea for that."

"The MDV can be its normal weight on primary descent. If we made the heat shield and outer hull detachable, they could ditch a lot of weight after landing at Ares 3, and have a lighter ship for the traverse to Ares 4. We're running the numbers now."

“Keep me posted,” Teddy said. He turned to Mindy. “Miss Park, welcome to the big leagues.”

“Sir,” Mindy said. She tried to ignore the lump in her throat.

“What’s the biggest gap in coverage we have on Watney right now?”

“Um,” Mindy said. “Once every forty-one hours, we’ll have a seventeen-minute gap. The orbits work out that way.”

“You had an immediate answer,” Teddy said. “Good. I like it when people are organized.”

“Thank you, sir.”

“I want that gap down to four minutes,” Teddy said. “I’m giving you total authority over satellite trajectories and orbital adjustments. Make it happen.”

“Yes, sir,” Mindy said, with no idea how to do it.

Teddy looked to Mitch. “Mitch, your e-mail said you had something urgent?”

“Yeah,” Mitch said. “How long are we gonna keep this from the Ares 3 crew? They all think Watney’s dead. It’s a huge drain on morale.”

Teddy looked to Venkat.

“Mitch,” Venkat said. “We discussed this—”

“No, *you* discussed it,” Mitch interrupted. “They think they lost a crewmate. They’re devastated.”

“And when they find out they *abandoned* a crewmate?” Venkat asked. “Will they feel better then?”

Mitch poked the table with his finger. “They deserve to know. You think Commander Lewis can’t handle the truth?”

“It’s a matter of morale,” Venkat said. “They can concentrate on getting home—”

“I make that call,” Mitch said. “I’m the one who decides what’s best for the crew. And I say we bring them up to speed.”

After a few moments of silence, all eyes turned to Teddy.

He thought for a moment. “Sorry, Mitch, I’m with Venkat on this one,” he said. “But as soon as we come up with a plan for rescue, we can tell *Hermes*. There needs to be some hope, or there’s no point in telling them.”

“Bullshit,” Mitch grumbled, crossing his arms. “Total bullshit.”

“I know you’re upset,” Teddy said calmly, “We’ll make it right. Just as soon as we have some idea how to save Watney.”

Teddy let a few seconds of quiet pass before moving on.

“Okay, JPL’s on the rescue option,” he said with a nod toward Bruce. “But it would be part of Ares 4. How does he stay alive till then? Venkat?”

Venkat opened a folder and glanced at the paperwork inside. “I had every team check and double-check the longevity of their systems. We’re pretty sure the Hab can keep working for four years. Especially with a human occupant fixing problems as they arise. But there’s no way around the food issue. He’ll start starving in a year. We *have* to send him supplies. Simple as that.”

“What about an Ares 4 presupply?” said Teddy. “Land it at Ares 3 instead.”

“That’s what we’re thinking, yeah,” Venkat confirmed. “Problem is, the original plan was to launch presupplies a year from now. They’re not ready yet.”

“It takes eight months to get a probe to Mars in the best of times. The positions of Earth and Mars right now...it’s not the best of times. We figure we can get there in nine months. Presuming he’s rationing his food, he’s got enough to last three hundred and fifty more days. That means we need to build a presupply in *three months*. JPL hasn’t even started yet.”

“That’ll be tight,” Bruce said. “Making a presupply is a six-month process. We’re set up to pipeline a bunch of them at once, not to make one in a hurry.”

“Sorry, Bruce,” Teddy said. “I know we’re asking a lot, but you have to find a way.”

“We’ll find a way,” Bruce said. “But the OT alone will be a nightmare.”

“Get started. I’ll find you the money.”

“There’s also the booster,” Venkat said. “The only way to get a probe to Mars with the planets in their current positions is to spend a butt-load of fuel. We only have one booster capable of doing that. The Delta IX that’s on the pad right now for the EagleEye 3 Saturn probe. We’ll have to steal that. I talked to ULA, and they just can’t make another booster in time.”

“The EagleEye 3 team will be pissed, but okay,” said Teddy. “We can delay their mission if JPL gets the payload done in time.”

Bruce rubbed his eyes. “We’ll do our best.”

“He’ll starve to death if you don’t,” Teddy said.

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VENKAT SIPPED his coffee and frowned at his computer. A month ago it would have been unthinkable to drink coffee at nine p.m. Now it was necessary fuel. Shift schedules, fund allocations, project juggling, out-and-out looting of other projects...he’d never pulled so many stunts in his life.

*“NASA’s a large organization,” he typed. “It doesn’t deal with sudden change well. The only reason we’re getting away with it is the desperate circumstances. Everyone’s pulling together to save Mark Watney, with no interdepartmental squabbling. I can’t tell you how rare that is. Even then, this is going to cost tens of millions, maybe hundreds of millions of dollars. The MDV modifications alone are an entire project that’s being staffed up. Hopefully, the public interest will make your job easier. We appreciate your continued support, Congressman, and hope you can sway the committee toward granting us the emergency funding we need.”*



He was interrupted by a knock at his door. Looking up, he saw Mindy. She wore sweats and a T-shirt, her hair in a sloppy ponytail. Fashion tended to suffer when work hours ran long.

“Sorry to bother you,” Mindy said.

“No bother,” Venkat said. “I could use a break. What’s up?”

“He’s on the move,” she said.

Venkat slouched in his chair. “Any chance it’s a test drive?”

She shook her head. “He drove straightaway from the Hab for almost two hours, did a short EVA, then drove for another two. We think the EVA was to change batteries.”

Venkat sighed heavily. “Maybe it’s just a longer test? An overnight trip kind of thing?”

“He’s seventy-six kilometers from the Hab,” Mindy said. “For an overnight test, wouldn’t he stay within walking distance?”

“Yes, he would,” Venkat said. “Damn it. We’ve had teams run every conceivable scenario. There’s just no way he can make it to Ares 4 with that setup. We never saw him load up the oxygenator or water reclaimer. He can’t possibly have enough basics to live long enough.”

“I don’t think he’s going to Ares 4,” Mindy said. “If he is, he’s taking a weird path.”

“Oh?” said Venkat.

“He went south-southwest. Schiaparelli crater is southeast.”

“Okay, maybe there’s hope,” Venkat said. “What’s he doing right now?”

“Recharging. He’s got all the solar cells set up,” Mindy said. “Last time he did that, it took twelve hours. I was going to sneak home for some sleep if that’s okay.”

“Sure, sounds good. We’ll see what he does tomorrow. Maybe he’ll go back to the Hab.”

“Maybe,” Mindy said, unconvinced.

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“WELCOME BACK,” Cathy said to the camera. “We’re chatting with Marcus Washington, from the US Postal Service. So, Mr. Washington, I understand the Ares 3 mission caused a postal service first. Can you explain that to our viewers?”

“Uh yeah,” said Marcus. “Everyone thought Mark Watney was dead for over two months. In that time, the postal service issued a run of commemorative stamps honoring his memory. Twenty thousand were printed and sent to post offices around the country.”

“And then it turned out he was alive,” Cathy said.

“Yeah,” said Marcus. “We don’t print stamps of living people. So we stopped the run immediately and recalled the stamps, but thousands were already sold.”

“Has this ever happened before?” Cathy asked.

“No. Not once in the history of the postal service.”

“I bet they’re worth a pretty penny now.”

Marcus chuckled. “Maybe. But like I said, thousands were sold. They’ll be rare, but not super-rare.”

Cathy chuckled then addressed the camera. “We’ve been speaking with Marcus Washington of the United States Postal Service. If you’ve got a Mark Watney commemorative stamp, you might want to hold on to it. Thanks for dropping by, Mr. Washington.”

“Thanks for having me,” Marcus said.

“Our next guest is Dr. Irene Shields, flight psychologist for the Ares missions. Dr. Shields, welcome to the program.”

“Thank you,” Irene said, adjusting her microphone clip.

“Do you know Mark Watney personally?”

“Of course,” Irene said. “I did monthly psych evaluations on each member of the crew.”

“What can you tell us about him? His personality, his mindset?”

“Well,” Irene said, “he’s very intelligent. All of them are, of course. But he’s particularly resourceful and a good problem-solver.”

“That may save his life,” Cathy interjected.

“It may indeed,” Irene agreed. “Also, he’s a good-natured man. Usually cheerful, with a great sense of humor. He’s quick with a joke. In the months leading up to launch, the crew was put through a grueling training schedule. They all showed signs of stress and moodiness. Mark was no exception, but the way he showed it was to crack more jokes and get everyone laughing.”

“He sounds like a great guy,” Cathy said.

“He really is,” Irene said. “He was chosen for the mission in part because of his personality. An Ares crew has to spend thirteen months together. Social compatibility is key. Mark not only fits well in any social group, he’s a catalyst to make the group work better. It was a *terrible* blow to the crew when he died.”

“And they still think he’s dead, right? The Ares 3 crew?”

“Yes, they do, unfortunately,” Irene confirmed. “The higher-ups decided to keep it from them, at least for now. I’m sure it wasn’t an easy decision.”

Cathy paused for a moment, then said, “All right. You know I have to ask: What’s going through his head right now? How does a man like Mark Watney respond to a situation like this? Stranded, alone, no idea we’re trying to help?”

“There’s no way to be sure,” Irene said. “The biggest threat is giving up hope. If he decides there’s no chance to survive, he’ll stop trying.”

“Then we’re okay for now, right?” Cathy said. “He seems to be working hard. He’s prepping the rover for a long trip and testing it. He plans to be there when Ares 4 lands.”

“That’s one interpretation, yes,” Irene said.

“Is there another?”

Irene carefully formed her answer before speaking. “When facing death, people want to be heard. They don’t want to die alone. He might just want the MAV radio so he can talk to another soul before he dies.

“If he’s lost hope, he won’t care about survival. His only concern will be making it to the radio. After that, he’ll probably take an easier way out than starvation. The medical supplies of an Ares mission have enough morphine to be lethal.”

After several seconds of complete silence in the studio, Cathy turned to the camera. “We’ll be right back.”

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“HEYA, VENK.” Bruce’s voice came from the speakerphone on Venkat’s desk.

“Bruce, hi,” said Venkat, typing on his computer. “Thanks for clearing up some time. I wanted to talk about the presupply.”

“Sure thing. What’s on your mind?”

“Let’s say we soft-land it perfectly. How will Mark know it happened? And how will he know where to look?”

“We’ve been thinking about that,” said Bruce. “We’ve got some ideas.”

“I’m all ears,” Venkat said, saving his document and closing his laptop.

“We’ll be sending him a comm system anyway, right? We could have it turn on after landing. It’ll broadcast on the rover and EVA suit frequencies. It’ll have to be a strong signal, too.

“The rovers were only designed to communicate with the Hab and each other; the signal origin was presumed to be within twenty kilometers. The receivers just aren’t very sensitive. The EVA suits are even worse. But as long as we

have a strong signal we should be good. Once we land the presupply, we'll get its exact location from satellites, then broadcast that to Mark so he can go get it."

"But he's probably not listening," said Venkat. "Why would he be?"

"We have a plan for that. We're going to make a bunch of bright green ribbons. Light enough to flutter around when dropped, even in Mars's atmosphere. Each ribbon will have 'MARK: TURN ON YOUR COMM' printed on it. We're working on a release mechanism now. During the landing sequence, of course. Ideally, about a thousand meters above the surface."

"I like it," Venkat said. "All he needs to do is notice one. And he's sure to check out a bright green ribbon if he sees one outside."

"Venk," said Bruce. "If he takes the 'Watneymobile' to Ares 4, this'll all be for nothing. I mean, we can land it at Ares 4 if that happens, but..."

"But he'll be without a Hab. Yeah," Venkat said. "One thing at a time. Let me know when you come up with a release mechanism for those ribbons."

"Will do."

After terminating the call, Venkat opened his laptop to get back to work. There was an e-mail from Mindy Park waiting for him. "*Watney's on the move again.*"

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"STILL GOING in a straight line," Mindy said, pointing to her monitor.

"I see," Venkat said. "He's sure as hell not going to Ares 4. Unless he's going around some natural obstacle."

"There's nothing for him to go around," Mindy said. "It's Acidalia Planitia."

“Are those the solar cells?” Venkat asked, pointing to the screen.

“Yeah,” Mindy said. “He did the usual two-hour drive, EVA, two-hour drive. He’s one hundred and fifty-six kilometers from the Hab now.”

They both peered at the screen.

“Wait...,” Venkat said. “Wait, no way...”

“What?” Mindy asked.

Venkat grabbed a pad of Post-its and a pen. “Give me his location, and the location of the Hab.”

Mindy checked her screen. “He’s currently at...28.9 degrees north, 29.6 degrees west.” With a few keystrokes, she brought up another file. “The Hab’s at 31.2 degrees north, 28.5 degrees west. What do you see?”

Venkat finished taking down the numbers. “Come with me,” he said, quickly walking out.

“Um,” Mindy stammered, following after. “Where are we going?”

“SatCon break room,” Venkat said. “You guys still have that map of Mars on the wall?”

“Sure,” Mindy said. “But it’s just a poster from the gift shop. I’ve got high-quality digital maps on my computer—”

“Nope. I can’t draw on those,” he said. Then, rounding the corner to the break room, he pointed to the Mars map on the wall. “I can draw on that.”

The break room was empty save for a computer technician sipping a cup of coffee. He looked up in alarm as Venkat and Mindy stormed in.

“Good, it has latitude and longitude lines,” Venkat said. Looking at his Post-it, then sliding his finger along the map, he drew an X. “That’s the Hab,” he said.

“Hey,” the technician said. “Are you drawing on our poster?”

“I’ll buy you a new one,” Venkat said without looking back. Then, he drew another X. “That’s his current location. Get me a ruler.”

Mindy looked left and right. Seeing no ruler, she grabbed the technician’s notebook.

“Hey!” the technician protested.

Using the notebook as a straight-edge, Venkat drew a line from the Hab to Mark’s location and beyond. Then took a step back.

“Yup! That’s where he’s going!” Venkat said excitedly.

“Oh!” Mindy said.

The line passed through the exact center of a bright yellow dot printed on the map.

“*Pathfinder!*” Mindy said. “He’s going to *Pathfinder!*”

“Yup!” Venkat said. “Now we’re getting somewhere. It’s like eight hundred kilometers from him. He can get there and back with supplies on hand.”

“And bring *Pathfinder* and Sojourner rover back with him,” Mindy added.

Venkat pulled out his cell phone. “We lost contact with *Pathfinder* in 1997. If he can get it online again, we can communicate. It might just need the solar cells cleaned. Even if it’s got a bigger problem, he’s an engineer!” Dialing, he added, “Fixing things is his job!”

Smiling for what felt like the first time in weeks, he held the phone to his ear and awaited a response. “Bruce? It’s Venkat. Everything just changed. Watney’s headed for *Pathfinder*. Yeah! I know, right!? Dig up everyone who was on that project and get them to JPL now. I’ll catch the next flight.”

Hanging up, he grinned at the map. “Mark, you sneaky, clever, son of a bitch!”