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**Project Azorian:
Man's Eternal Quest for Manganese**

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OPERATION AZORIAN:
MANKIND'S ETERNAL QUEST FOR MANGANESE

By Kenneth A. Ballou

On a United States vessel in the vast Pacific Ocean during the height of the Cold War, a solemn ceremony took place. Those on the ship stood at attention in reverential silence as the flag under which six young sailors had served was draped over their mortal remains. With the full dignity and honors due those who had made the ultimate sacrifice in service to their country, the steel coffins were lowered into the dark waters and consigned to the deep. The crew members then carefully folded that flag for eventual presentation, along with a videotape of the ceremony, to the successors of the government whom the sailors had faithfully served: the *Union of Soviet Socialist Republics*.

For the time being, however, none of their countrymen would learn of these events. No one would. The ship was the *Hughes Glomar Explorer*. It was a private commercial ship testing new proprietary equipment and techniques for mining the mineral bounty lying on the ocean's floor in the middle of the north Pacific. Specifically, it was harvesting nodules of manganese, a mineral commonly used in a number of industrial applications, including the manufacture of high-grade steel. The *Glomar Explorer* was purported to be the brainchild of reclusive genius Howard Hughes and the talented engineers and scientists under his employ. It was a truly one-of-a-kind technological marvel. And it was not at all what it appeared to be.

To understand why the American crew of the *Glomar Explorer* was performing a burial at sea for six Soviet sailors, we must go back to another cold day on the north Pacific. Just after midnight on February 25, 1968, the Soviet submarine K-129 signaled a farewell to its Naval surface escort as it departed its home port of Petropavlovsk, near Vladivostok, on the Kamchatka peninsula of the Soviet Union's pacific coast. The K-129, with its captain Vladimir Ivanovich Kobzar and its complement of ninety-eight sailors was not supposed to be leaving her home port on that day. She had only returned from her regularly scheduled combat patrol twelve weeks earlier. According to the usual fleet operating procedures, she should have been laid up for routine maintenance, testing, and necessary repairs for six months. Fate, however, had other plans for K-129 and her crew.

Captain Kobzar was considered one of the most experienced and trusted submarine commanders in the Soviet Pacific Fleet. He out-ranked nearly all of his fellow captains in

his submarine unit. His boat, the K-129, was designated as a Project 629A vessel in the official Soviet nomenclature, or a Golf II boat by NATO reckoning. It was a diesel-electric guided missile submarine. Its mission was to silently lurk on station near the naval base at Pearl Harbor, its missiles at the ready to wreak havoc upon the home of the U.S. Pacific Fleet at a moment's notice. Without warning. Its role was very similar to that assigned to NATO submarines tasked to menace Soviet and Warsaw Pact installations as part of the "mutually assured destruction" paradigm so central to the balance of power during the Cold War. Needless to say, it was a very dangerous game. In fact, it is a testament to the cool headedness of the military professionals on both sides when one considers how few losses were experienced, outside of actual "hot" conflicts such as Vietnam, during the cold war.

Unfortunately for Captain Kobzar and his crew, there had been unforeseen problems with another boat in their submarine squadron necessitating changes in the operations schedule. The leadership, in an effort to stay on tempo, decided to send the K-129 out on another combat patrol after only a few short weeks in port, much sooner than they had anticipated. Captain Kobzar objected to these changes, as some of his crew had already left on leave and would have to be called back from well-deserved "R & R" with their families. Morale could potentially suffer. Another reason for the built in down-time in the operations schedule was to allow for routine maintenance of the boat and repairs of the inevitable "wear and tear" from months at sea. Additionally, there was always a fresh cohort of new crew members to compensate for the usual crew attrition. These new crewmen would need to be "trained up" on the idiosyncrasies of the K-129 in order to perform their new duties at the high level of proficiency upon which the lives of the entire crew may depend in time of crisis. This training usually occurred during these regularly scheduled "rest" periods in home port. All of these activities would now be curtailed, potentially making this "tip of the spear" somewhat less sharp.

As the K-129 began her journey east that early morning, she would follow a well-established path along the 40th parallel to its duty station 1000 nautical miles northwest of Oahu for a combat patrol of seventy days duration in total. Traveling at an average of four knots, it had a projected transit time to and from its duty station of fifteen to twenty days each way. Along the way it would ascend close to the surface at night to allow her snorkel to jut ever so slightly above the waves in order to access fresh air for the diesel engines that in turn would recharge the electric batteries upon which the sub depended for submerged operations. This time near the surface also allowed for the signal mast to breach the surface and allow the antenna to send updates to headquarters at specific pre-arranged points in the mission. These messages were encrypted and in the form of highly compressed "burst signals" designed to minimize the chance of their being noticed by

adversaries. One such signal was sent on February 26. The next message was expected at midnight on March 7/8, representing the midpoint of her transit. That signal never arrived.

As the time grew longer and longer past the anticipated signal time, leadership's attitude at Petropavlovsk and Moscow progressed from curious to annoyed and finally to alarmed. After several days of sending radio orders for K-129 to respond, panic set in. On March 10 the Soviet Pacific Fleet was sent out in search of the missing boat. The K-129 represented some of the latest advances in the Soviet Union's submarine design, construction, and missile technology. It also held state secrets regarding naval tactics and communications/cryptography. Surface ships and submarines set out from the Siberian ports to sweep the ocean, converging on the area where the K-129 *should* have been on March 7, literally in the middle of the Pacific at 172° 30' East and 40° North. Their best efforts to find and hopefully rescue their comrades, and the precious vessel in which they sailed, were in vain. To their despair, none were able to discover where the K-129 had gone.

The United States Navy had a pretty good idea, though. Usually, a U.S. Navy attack submarine would be positioned just off Petropavlovsk and silently shadow outgoing Soviet subs as they began their patrols. The U.S.S. *Barb* should have been following the K-129, but due the previously mentioned alterations in the Soviet patrol schedule, to which Naval Intelligence was not privy, she wasn't. The K-129 had slipped out unmarked. She had, however, been detected by The United States' highly advanced (and classified) array of hydrophonic sensors on the Pacific seafloor called the Sound Surveillance System, or SOSUS. More importantly, the Department of Defense had also implemented a very sophisticated suite of technologies and procedures to collect, correlate, and analyze the sensor data in order to generate useful real-time intel regarding the coming and going of the Soviet Union's undersea fleet. Code named Bulls Eye and Boresight, the system was augmented by the Air Force Technical Applications Center's (AFTAC) more limited, but even more sensitive system deployed to monitor the Soviet missile program. As the U.S. intelligence apparatus noted the none-too-subtle Soviet search activities and surmised correctly that a vessel must have gone missing, analysts began pouring over recordings from the SOSUS and AFTAC systems. Eventually they were able to identify sound evidence indicative of not only when, but more intriguingly *where*, the K-129 had met her demise.

Of course, this information was highly proprietary and *not* to be shared with the Soviets. Afterall, the Soviet Union had not even acknowledged the loss of the sub to their own people, let alone to the Western world. We could not let on that we had a bead on where the K-129 rested. We couldn't even acknowledge that we knew the K-129 had been lost. This intelligence represented a unique set of potential opportunities. If we could gain access to her secrets, it would potentially open the door to a wealth of intelligence from

cryptography to the state of Soviet metallurgical advances. And the K-129 was a guided missile submarine. To analyze the current state of Soviet missile and nuclear weapon technology would give us a keen insight into our advisory's capabilities. There was just one problem: the K-129 now rested at 16,500 feet below sea level in the middle of the Pacific Ocean. No one had ever attempted a salvage operation from anything even close to those depths. And if we somehow could accomplish such a feat, how would we do it without the Soviets knowing? Surely they would attempt to stop us, or worse yet wait until we had salvaged the boat and then thank us for finding their property while they steamed away with it.

This was going to be a very challenging project. The Central Intelligence Agency (CIA) and the United States Navy (USN) would need to collaborate. A project like this would also need blessing from the very highest level of the United States Government. The President would need to sign off on a project of this magnitude. There were potential downsides. If the Soviets caught on to what we were doing, it would cause an international crisis, perhaps even war. And a project of this magnitude would come with an equally large price tag. All of this needed to be taken into account.

The engineering challenges alone were daunting. The submarine was estimated to weigh 3,920,000 pounds and needed to be lifted nearly 3 miles from the ocean floor to the surface. In 1968 the Director of the CIA, Richard Helms, initiated meetings with the Deputy Secretary of Defense (DoD) David Packard. Along with the Science Advisor to the President Lee DuBridge, they formed the Executive Committee (ExCom) for what would become Project Azorian. Over the next several months key players were brought in as the complex plan took shape. By August of 1969, the ExCom felt they had enough product to advise the President of their work, so Secretary of State Henry Kissinger sent a top-secret memorandum to President Nixon. Security was of the utmost importance and was thus given the CIA's top priority under the code name Jennifer.

As the engineers assessed the problem, three approaches were identified for bringing the sub to surface. A "trade ballast/buoyancy" approach would involve a utilizing a structure with a large amount of buoyancy but initially weighted down with an even larger amount of ballast that would descend and attach itself to the sub. The ballast would then be released, and all that buoyancy would then lift the sub to the surface. Another option was the "at depth generation of buoyancy" method in which buoyant gases would be produced at the site of the wreck. This could be achieved by allowing cryogenically liquified hydrogen or nitrogen to return to their gaseous states at the site, or even "creating" hydrogen and oxygen gasses by the electrolysis of seawater or the catalytic conversion of other chemical compounds to produce buoyancy. The third possibility was the "brute

force” approach of reaching down with a claw-like mechanism on a “string” and simply pulling the sub up, reminiscent of the claw-snatch game at an arcade parlor. Due to the constraints of time, money, and security, whichever method they chose would be a one-time only attempt. There would be no second chances, no “plan B”. As the feasibility studies progressed, the “brute force” paradigm emerged as the best option and was officially authorized on September 11, 1970.

A host of engineering challenges needed to be addressed. A recovery ship would need to be found or built. The “pipe-string” would need to be designed, as well as the capture vehicle to physically wrest the sub from the ocean floor. Data management and control units would need to be designed. Was the condition of the K-129 amenable to recovery in the first place? It was estimated that to take on each of these issues in sequence would take six to eight years. Not only would this drive the financial cost of the project to prohibitive levels, but it would also increase the likelihood that by the time the target was salvaged for analysis, whatever intelligence gained in the areas of weapons technology, cryptography, and engineering would no longer be “state of the art” and ultimately not worth the outlay of resources. The decision was made to approach each of these challenges *concurrently*. This would demand careful planning, prescient foresight, and unhindered communication and coordination between the different project units and between the military, intelligence, and civilian industry constituents. Most importantly, meticulous and stringent security measures would be necessary.

First on the list of project elements was the surface ship with which to recover the “target”. It would need to be able to bring a 1750 ton object, roughly the size and weight of a World War II destroyer, up from a depth of 3 miles below the surface. This would need to be accomplished in rough seas in the middle of the Pacific, even under the best of circumstances, during the annual two-month operational window, were judged to be extremely challenging. Additionally, this would have to be accomplished in secret with no external indication suggesting its true purpose.

The team also faced the question of how to get the “claw” down to the sub from the surface ship with the necessary degree of accuracy. The problem was likened to picking up a penny on the pavement using a fishing line. From the top of the Empire State Building. Fortunately, American industry had found an answer. The offshore oil drilling company Global Marine Corporation had recently demonstrated an amazing feat in shipboard stabilization technology. In early 1970, the drilling ship *Glomar Challenger* (which had previously demonstrated its ability to drill at depths of 20,483 feet) had drilled a 16 foot diameter hole into the floor of the Atlantic at a depth of 10,000 feet. It had subsequently withdrawn the drill bit from the hole and then replaced it with another drill bit into the same

hole. This was performed *without the ship being at anchor*. This unprecedented level of precision was accomplished by the use of hydrothrusters onboard the ship guided by very precise data from sonar buoys moored to the ocean floor and a sonar transponder embedded into the drill bit apparatus. Based on these recent technological advances, Global Marine was chosen to design and operate the ship in cooperation with the Hughes Tool Company (later renamed the Summa Corporation). It was to be constructed by the Sun Shipbuilding and Drydock Company at its shipyard at Chester, PA.

Howard Hughes had been approached as a partner because his company was capable of fabricating the unique and specialized equipment needed for the project and because the company had a proven track-record for reliability when working on government projects in the “black” (i.e. secret projects). The cover story was developed that the eccentric industrialist Howard Hughes was designing and deploying an oversized ship chock full of secretive proprietary innovations to mine for minerals on the deep ocean floor. Who else but the father of the “Spruce Goose” would dream up such a scheme and have the resources to attempt it? The ship would be christened the *Hughes Global Marine Explorer*, or *Glomar Explorer*.

The novel design of the *Glomar Explorer* was the brainchild of the gifted maritime architect and construction supervisor John Graham. She would be 619 feet in length, have a 116 foot beam, and at the highest point of its towers reach a height of 236 feet above the waterline. She would have a dry displacement of 51,310 long tons. The design provided for a complement of up to 178 crew. Her keel was laid on November 16, 1971. All of this was truly impressive, making it one of the largest drilling rig ships afloat. She was to be a marvel in terms of size, but she appeared to be merely a larger version of many other ships already searching for oil from beneath the ocean floor. On the surface, her exceptionality appeared to be of a quantitative but not qualitative nature. What made this ship truly unique, however, was what she hid below decks.

What no one would know from even careful examination of her outward appearance was that she harbored a large well, or “moon pool” that had a retractable floor on her keel that could open wide like a giant window through which to access the depths below. Through this large portal the machinery on the ship would lower the recovery vehicle, assemble the pipe string on descent and disassemble the same upon ascent, and recover and store the “target” for processing and analysis. Thanks to the fortuitous decision to design and build the various aspects of this project concurrently, when it was discovered that the moon pool width needed to be enlarged from 69 feet to 74 feet in order to accommodate the recovery vehicle, the ship’s beam was able to be increased to 116 feet at a point in the construction when it could still be accomplished without prohibitive additional costs. This unfortunately

had the effect of making the ship unable to traverse the Panama Canal, but undoubtedly imbued a margin of safety when she was heaving the K-129 up from the deep. The heavy lift mechanism was the largest and most powerful ever built, able to heave an object of 8000 tons. The *Glomar Explorer* departed the Sun shipyard in July of 1972, just 20 months after construction had commenced.

The mechanical technology needed to lift the sub also came from the offshore oil industry. It was decided that sections of pipe 30 foot in length and 15 inches in diameter weighing 7.5 tons each would be pieced together as they were lowered to depth, then disassembled as the pipe-string (and the target) were brought back to the surface. The threading on each pipe was carefully designed to allow for the pipe string to stay together well enough to withstand the load yet be able to unscrew easily during the disassembly process on ascent.

While the *Glomar Explorer* was being constructed in Pennsylvania, on the other side of the continent the largest submersible barge ever built was being constructed at San Diego. The *Hughs Mining Barge-1* or *HMB-1*, was built to accommodate the construction and deployment of the capture vehicle (the “claw” that would grab the target). While the *Glomar Explorer* and the *HMB-1* were exceptionally large but otherwise unremarkable examples of standard maritime industrial construction, the capture vehicle was a truly unique and specialized piece of equipment. The ship and barge could be explained away as part of a mining expedition, but even a cursory analysis of the capture vehicle would raise suspicions as to its true purpose. And that purpose was *highly* classified. Weighing 2,400 tons, it had the configuration of several retractable semicircular arms connected to a central spine. It did not in any way resemble a cross between a hoover vacuum and a street sweeper that one would envision using to sweep up manganese nodules off the ocean floor. The capture vehicle was obviously meant to grab and hold onto something large. And possibly submarine shaped. Despite the capture vehicle being called “Clementine” (as in the daughter of the ‘forty-niner miner”), it would not fool anyone who saw it. So, no one ever would. At least no one who wasn’t cleared to do so. Its entire fabrication took place inside the *HBM-1* once the barge had passed its trials and made its way to Redwood City. Afterward the *HMB-1*, with the Clementine hidden inside, would meet up with the newly constructed *Hughes Glomar Explorer* in order to transfer the Clementine into the cavity of her cavernous moon pool.

This would occur after the *Glomar Explorer* made its way around the Straits of Magellan and up the western coast of two continents. As fate would have it, she even put in at Valparaiso at the height of the Chilean coup d’etat that brought Augusto Pinochet to power. Luckily, CIA agents in the field were able to facilitate her speedy departure from the very

turbulent region. Eventually, she was able to meet up with the HMB-1 off the coast of Southern California, in the Isthmus Cove of Catalina Island. The HMB-1 nestled itself just underneath the *Glomar Explorer* which opened the bay doors to the moon pool well. The Clementine was secured to the *Glomar Explorer*'s wrenching system and brought into the hold, after which the bay doors closed and the HMB-1 parted company with the larger ship. The time had come to commence with the actual recovery mission.

The Hughes *Glomar Explorer* arrived at the recovery site on July 4, 1974. First the crew deployed the sonar buoys in a grid pattern that would allow the Clementine to accurately deploy on the submarine target. After this was completed, there were delays due to poor weather and high seas caused by typhoon Gilda. As the pipe string and lifting machinery were being given their final tests before the actual deployment, on July 13 a passing British-flagged freighter signaled that they were in need of medical assistance for an ill crew member. In accordance with the traditions of the sea (and so as not to blow their cover as just another commercial operation), the *Glomar Explorer* rendered aid, even bringing the stricken crew member on board for x-rays and treatment. In the end the visitor was fine and the entire incident garnered the crew of the *Glomar Explorer* a case of beer and the gratitude of the British freighter's captain. It also allowed for radio communications "in the clear" regarding this event, thus reinforcing Azorian's cover, just in case there were any Soviet ears monitoring the airways.

As luck would have it, on July 17, a Soviet missile range instrumentation ship returning from an operation monitoring a Soyuz space event took a detour to investigate the strange western vessel in the middle of the Pacific. The *Chazhma* had a helicopter, which it deployed several times to closely observe the *Glomar Explorer* while the mother ship loitered close by. The Soviet crew on the ship and on the helicopter took copious amounts of photographs of the mining ship from every conceivable angle. When at one point the Soviet ship approached to within 500 yards, precautions were taken to pile crates on the *Glomar Explorer*'s helipad and crew were stationed on the forward deck in order to repel any unwanted guests. The Soviet ship communicated by signal lights and radio, even trying to trick the Americans into answering a question posed in Russian. The HGE stayed cool and stuck to the cover story. All the while, crew below decks were busy lowering the Clementine down toward the Soviet sub. The *Chazhma* never suspected a thing. Finally after six tense hours of scrutiny, the Soviet warship bade them farewell and continued on to its home port, which ironically was Petropavlovsk.

Work continued as the pipe string assembly brought the Clementine closer and closer to the target. Tensions aboard the *Glomar Explorer* rose again when a second Soviet Naval ship, this time an ocean-going salvage tug called the *SB-10* arrived on the scene on July 20.

At times it approached as close as 200 feet, running up and down the length of the larger ship, taking pictures and trying to be as intimidating as possible. The crew of the *Glomar Explorer* kept a wary eye on the *SB-10*'s behavior, at times training their flood lights on the intruder anytime it approached too closely during the night. The crew even amused themselves by throwing innocent non-classified paper trash overboard just to watch the Soviets scramble to gather it up, presumably to analyze it for any potential intelligence value.

All the while, unbeknownst to the Soviet visitors, the subsurface mission continued. On July 26, the *Clementine* reached the ocean floor. The sensors were used to position it over the target. 16,440 feet of pipe had been deployed. *Clementine* grasped the target and retrieval commenced on August 1. An "in the clear" radio message was sent to Global Marine headquarters that the nodule collecting device had inadvertently struck a hard outcrop resulting in damage that would necessitate the cessation of operations and a return for repairs. This was to establish the cover story for the return to Hawaii for a crew change-out and completion of the mission. All was going according to plan. The forward third of the K-129, including the cryptologic compartment and the missile tubes, was in *Clementine*'s grasp when a major setback struck. While the target was 1/3 of the way up, it broke apart. As it turned out, the portion containing the missiles and the cryptologic material sank back down to the seafloor. Luckily, this sudden shift in load weight did not cause any damage to the lift equipment. The crew, however, were crestfallen.

The portion that remained in *Clementine*'s grasp was brought up into the moon pool. The doors were shut, and the seawater was pumped out of the well. Amazingly, all of this was performed even as the Soviet naval vessel continued to observe and at times harass the *Glomar Explorer*. The crew had salvaged a portion of the Soviet submarine literally from right under the noses of the Soviet Navy.

Once safely on board, specially trained crew members cleaned, catalogued, and documented every piece of the K-129 that the *Clementine* had brought up. Special techniques were used for paper items, and care was taken to account for any dangerous chemicals and radiation that they might encounter. No nuclear missiles were recovered, but at least one nuclear torpedo was salvaged. While the exact contents of the haul are still classified, there is no evidence that any cryptologic material was recovered. While later interviews from former Soviet officials after the Cold War confirmed assumptions that they had changed their communication codes immediately upon realizing the K-129 was lost in 1968, any information that we could have recovered might have nonetheless given us insights into their secure communications infrastructure and methods. It was not to be,

however. In a more sobering discovery, the remains of six Soviet sailors were recovered and respectfully prepared for burial at sea.

Interestingly, theories as to the cause of the sub's demise were reinforced by the analysis of the salvaged portion of the K-129. The hydrophonic evidence from the Naval and Air Force sensors indicated two explosions in quick succession. While the Soviets had their own theory that the K-129 had collided with an American submarine, the U.S.S. *Swordfish*, neither the physical evidence from the recovered portion of K-129, nor the mild damage to the sail of the U.S. vessel, nor the SOSUS data supported this theory. Evidence from the recovered debris did support the theory that as the communications mast deployed in order to send a radio transmit while at snorkel depth, a malfunction caused an electrical spark that set off explosions in the missile control areas. This would have caused the rocket engines to ignite which would have inflicted catastrophic physical damage to the surrounding spaces and filled the entire crew space with a fatal level of super-heated toxic gases. All of this doomed the boat to a very quick and unrecoverable state of catastrophic failure. Evidence of the sudden and unexpected nature of the event was bolstered by the physical locations of the six crewmen recovered, who did not appear to not be in any state of "battle stations" or emergency recovery posturing.

After initial analysis of the recovered material, the CIA was impressed by what they found and tantalized by the prospect of what was lost. They suggested making a second pass to attempt the recovery of the portion of the sub that broke off under the code name Matador. By this time, however, the Soviets had caught on to what we were up to. A written note had been literally slipped under the door of the Soviet embassy in Washington, D.C. on October 22, 1970, informing them the United States was going to try and recover a downed submarine. The Soviets discounted it at the time because they surmised that no technology existed for such an operation, and if they hadn't been able to find their own sub, what would make them think the Yankees had? Later, on June 5, 1974, a burglary occurred at the Los Angeles headquarters of the Summa Corporation, formerly the Hughs Tool Company. Among the items lost were some classified documents that implicated the company in a salvage mission for a downed submarine. The perpetrator was never found, but documentation of the investigation by local law enforcement provided the first chink in the security armor that had enveloped the project up to that time. The press was not far behind. Whether or not the Soviets had anything to do with the break in, or if they merely had informants somewhere along the chain that ran from the local authorities to the local press, in any case they were able to piece together that we had found the sub and were at least trying to recover its secrets. At a diplomatic dinner party reception, the Soviet Naval attaché informed an American Naval officer in attendance that the Soviets were aware of

what the Americans had done, and that if they tried to go back for any more salvage operations, it would mean war. Operation Matador was scuttled.

The *Glomar Explorer*, despite all the effort and innovations related to her creation and operational history, was subsequently sold to private sector oil exploration companies and eventually scrapped. The submersible barge and the *Clementine* were scrapped as well. The physical items brought up from the wreck are said to reside in a secure government warehouse on the Naval base in Bangor, Washington. The inventory of what was or wasn't salvaged is still classified. In light of this, while the intelligence value may be questionable, the technological and engineering advances involved in the endeavor are not debatable. While it was undeniably an intelligence coup during a phase of the Cold War when the West was not scoring many victories, one may ask, however, if the \$500 million spent on the project, roughly the equivalent to the budget for a NASA lunar mission, was worth it? That is a matter for the historians, and the jury is still out.

The video tape of the burial at sea and personal effects of the six Soviet sailors was given to Boris Yeltsin in December 1991 along with the Soviet naval ensign used in the ceremony. The K-129's ship's bell, in which according to maritime tradition the soul of the boat resides, was also presented to the post-Cold War Russian leader. The ceremony for the Soviet sailors was not the only burial at sea aboard the *Glomar Explorer*. The principal architect and chief engineer in the *Glomar Explorer's* construction, John Graham, succumbed to lung cancer in August 1972. His ashes were later flown to Hawaii and transported to his ship as it stood off the island's coast. His remains were passed overboard on September 10, 1974, in accordance with his wishes.

Ironically, more than a few manganese nodules were inadvertently brought up along with the salvaged remains of the K-129.

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Ken Ballou Biographical Sketch

Ken Ballou was born in Lincoln, Nebraska to two dedicated high school teachers. After living several years in Northern Illinois, his family moved to the Redlands area during the summer between his fourth and fifth grade years. After completing his education locally, he and his wife Michelle moved to Maryland where he served in the Air Force at Andrews AFB. Soon after a stint at Luke AFB in Arizona, they returned to Redlands in 2001 with a daughter (Laura) and son (Benjamin) in tow. He practiced at Beaver Medical Group (remember them?) until he joined the faculty at the University of California Riverside School of Medicine, where he toils to this day in order to provide their dogs Millie and Olive the opulent lifestyle to which they have become accustomed.

Project Azorian: Man's Eternal Quest for Manganese

A Summary

In 1968 during the height of the Cold War, a Soviet guided missile submarine sank in the middle of the Pacific Ocean. Although the Soviets were unable to find their missing boat, the United States used classified technology to locate the stricken vessel. Over the course of several years, the CIA and the U.S. Navy were able to build and deploy a novel seagoing operation to lift at least a portion of the submarine up from the deep Pacific depths for intelligence analysis. In order to conceal its true purpose from the Soviet Union, the operation was performed under the guise of a massive commercial venture to mine manganese nodules from the seafloor. While the ultimate intelligence value of the salvaged submarine remains controversial, without question the operation was a technological and operational feat unparalleled during the Cold War and perhaps even to this day.