



Cradle of the Cosmic Age

By Russ Murray



Above: Security Aircraft Corporation in 1932, Downey CA, at Washburn Crossing Rd. and Cerritos Ave. (Lakewood) Blvd.



Above: North American Aviation and surrounding Downey homes in 1961, at Lakewood Blvd. and Alameda St.

History of the Downey NASA Industrial Site

12214 Lakewood Blvd. Downey, Ca. 90242

The following history of the NASA Downey Site was prepared by North American Rockwell in the late 1970's. It represents one of the best and most comprehensive treatments of the site up to that time.



Cradle of The Cosmic Age

By Russ Murray

When it comes time to memorialize the origins of space flight, there is an industrial plant in Downey, Calif., that would certainly qualify as a shrine.

This Downey plant was the birthplace, homestead and laboratory for much of America's wondrous space technology- the Space Age's equivalent of Orville and Wilbur's bicycle shop. It is here in Downey that space structure, guidance and power were prominently pioneered. And it is here that the celebrated Apollo command was created and manufactured.

An odd conglomeration of buildings set amid the urban trackdom of the southeast Los Angeles metro-mass, the Downey facility is impressive only in the size of its sprawl, and fascinates only in the contemplation of its architectural strata. It is now a National Aeronautics and Space Administration property and occupied by Rockwell International Corporation, but its legend pre-dates present labeling. The cursive brickwork of its front offices along busy Lakewood Blvd. Gives clue to the plant's beginning: streamline modern, early 1930s.

The Downey plant was begun in 1929 by the E.M. Smith Company, which built airplanes under the Emsco name until it failed in the 1932 Depression. The next resident was the National Security Aircraft Corporation (above), headed by Walter Kinner, a noted producer of sport planes. It was a short stay. In 1936 the Vultee Aircraft Corporation moved in.



Downey Vultee BT13 Production Line

Behind the front offices is the saw tooth roofline of the vast factory bay where Vultee assembled over 11,000 military planes during World War II. The most famous of these was the BT-13, a low-wing trainer that was inspiringly christened "Valiant," but suffered the ignominy of its service nickname, the Vultee "Vibrator." The present occupant, Rockwell International (see North American Aviation, Inc.), entered in 1947.

Not so really long ago, in 1969, U.S. astronauts Neil Armstrong and Mike Collins, shortly out of quarantine after their world-stirring Apollo 11 lunar landing mission, spoke to an assembly of Downey plant workers. Said Collins: "the trip to the moon started right here."

In a material sense, that was so. They laid the keel and constructed the crew ship (command and service modules) of the Apollo space vehicle at Downey, whereupon it was transported to Cape Kennedy and rocketed to lunar orbit.

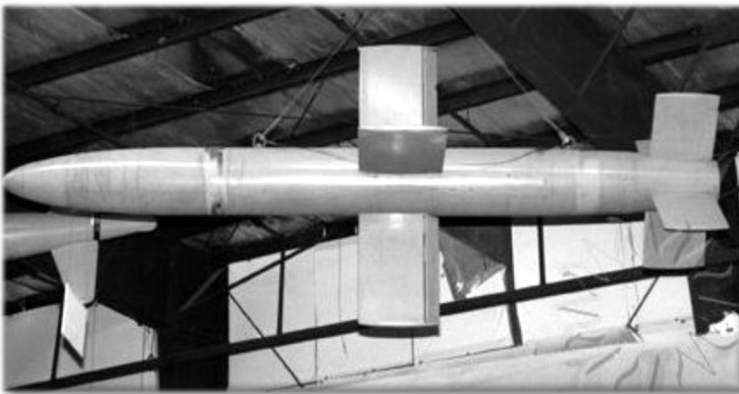
It took the Apollo astronauts less than two and one-half days to go from earth to moon, but it was a tedious quarter-century of travel along the advanced technology trail before the U.S. could arrive flight-ready for the venture.

American space capability traces to the German missile projects of World War II, but nowhere was this elementary missile science more significant than at Downey.

In June 1944 Germany unleashed its V-2 ballistic missile against the Allies, and it was indefensible. Had the V-2 been developed a bit earlier and performed with a mite more reliability, the denouement of the war might have been quite different. With the fall of the Nazis, the Americans and British were able to beat the Russians to 341 boxcars of missile components, a cache of technical documentation, and 128 German rocketeers, including the estimable Dr. Werner von Braun.

The confiscated documentation chillingly revealed progressively advancing missile concepts culminating with an A-9/A-10 two-stage rocket weapon calculated to strike the U.S. mainland.

The war plan of the Allies had been to swamp the enemy with great quantities of aircraft, so the missile prospect was scarcely considered by the U.S. As a consequence, when the U.S. started to seriously look into the missile opportunity in 1945 the successful German V-2 was a bird in the hand. The expropriated German missile hardware, technical literature and men were distributed to the U.S. military centers and defense contractors for their interest and application. The American Space Age commenced with this issuance.



The Downey plant first became associated with missile technology in 1945 when it was functioning as the Vultee Field Division of the Consolidated-Vultee Aircraft Corporation. With the winding-down of warplane production, it had a small project underway for a short-range Navy missile called the Lark (left).

As it was somewhat started in missile endeavor, the Division was given the Corporate role to follow up on German missile evidence.

In 1946 the Vultee Field Division was awarded a \$1.2 million contract by the government to study the possibility of the long range missile weapon. The study was identified as Project MX-774, and it was to explore two types: a subsonic jet-engined cruise missile- essentially an unmanned airplane; and a rocket-powered supersonic ballistic missile.

Vultee quickly dismissed the cruise missile option as too slow and too vulnerable, and concentrated on the ballistic weapon. However attractive the V-2 was as a starting point, the translation to a long range missile would be feasible only if the weight could be dramatically reduced. The V-2, typically of German mien, was structurally robust. The weight-saving ideas entered by the Vultee Field Division were of radical simplicity. First, they eliminated the fuel tanks inside the missile body, and, instead, let the shell of the air-frame contain the fuel. Then they did away with much of the longitudinal bracing by the clever expedient of inflating the body to stiffness with the nitrogen gas that was used to pressurize the fuel.

Since a long range ballistic missile would have to arc into near space and then plunge down through the atmosphere, it would have to be coated with heavy heat-resistant material. Nose cone warhead separation was introduced so only the business end would have to be heat-protected. A way was found around the weighty problem of fin or thrust-deflector control systems by the technique of swiveling the engine exhaust bell to the direction of push required.

Project MX-774 (below) didn't get much farther at Downey, because in July 1946 it was cancelled by a government defense economy edict. The Vultee Field Division was immediately withdrawn to the home plant in San Diego (Consolidate-Vultee became the Convair Division of the General Dynamics Corporation).



The three test missiles begun with the MX-774 project were later completed with some extensions of funding, but their flight attempts fizzled. The ballistic missile effort prevailed, though, and in 1951 was renamed the Atlas project. Ultimately the Atlas became the first U.S. intercontinental ballistic missile and the workhorse of the early American space launches, including the Project Mercury manned flights.

While the space history-making Atlas was germinating in Downey, that was only the beginning of the site's remarkable contribution. For as the Vultee Field Division was taking its first step into missile technology there was another

company cross-town in Inglewood that was similarly astir with missile ambition- North American Aviation. It would next occupy the Downey plant.

North American Aviation, Inc. had been the nation's most prolific plane manufacturer during World War II, with an output of 43,000 aircraft, 10,000 more than any other U.S. producer. As war-ending was driving its peak employment of 91,000 down to 5,000, North American could spare only five engineers for initial theoretical investigation of the missile.

Behind a door marked Technical Research Laboratory, the handful of North American engineers worked out a scheme for forwarding the basic German missile technology. First they would add wings to the V-2, increasing its 185-mile range to about 300 miles. Next they would replace the V-2 rocket engine with a long-running jet engine. Later, technology willing, they would create a very large launching rocket to boost the missile to extreme altitude for a cruise trajectory of intercontinental span.

To develop such a missile system would take an extensive study and advancement in four areas - super-sonic aerodynamics, propulsion, guidance and control, and a catch-all category of structures, launching systems and warhead.

Proceeding under the same issue of Air Force contracts that started Consolidated-Vultee on the road to the Atlas, this one called Project MX-770, North American began familiarizing itself with rocket systems by picking over some V-2 engines they had received as war booty and firing some experimental rocket propulsion units at a stand off in an unused corner of the company parking lot alongside what is now Los Angeles International Airport. Thus began the power train that bore the U.S. directly to space. With 42 people working on the MX-770 program in 1946, the North American team adopted a futuristic name, the Aerophysics Laboratory, and began design and construction of a small trail missile called the NATIV (North American Test Instrument Vehicle) to gain experience in launch and flight operations. A year later the company committed \$1 million of scarce money to begin construction of a supersonic wind tunnel and rocket test facility. The rocket test site was placed away from the Los Angeles population in the Santa Susana Mountains above the San Fernando Valley.

When North American Aviation first occupied the Downey plant in December 1947 (on month-to-month leases with the joint Air Force and Convair owners), it was for the purpose of accommodating overflow manufacturing of aircraft. The jet had freshly arrived and new plane contracts were filling the Inglewood plant. Also, North American could use the Downey facility for growing products in aviation control and electronics systems. Indeed, the Electro-mechanical Division was the name originally given to the North American Downey operation.



NATIV in comparison with Navaho

The Aerophysics Laboratory missile project was shifted to Downey in 1948 when its growth to 500 called for more room. Immediately settling in Downey, the missile project generated innovation and invention that quickly outmoded the belaboring of German wartime example. Its progress in the next few years was even more productive than German accomplishments under wartime priority

and funds. The NATIV (smaller missile above with Navaho) flight test program, initially successful, was abandoned when this newly-bred technology evidenced potential for long range missiles. The Downey operation became the Missile and Control Equipment Division (MACE) and dedicated itself to missile technology.

Effective automatic guidance and control which had befuddled the Germans in long research was solved with an inertial system employing a gyro-stabilized platform for each reference in flight. Special instruments for measuring flight accelerations and computing for pre-set spatial positions were developed, along with an autopilot that would precisely manipulate the missile to the required in-flight position.

The all-inertial auto navigation system developed at Downey was successfully flight-tested in 1950, and was a hallmark aerospace accomplishment.

The metallurgical and structural advances at Downey prefaced the use of high strength steels and light/tough titanium in airframes for withstanding sustained flight in the supersonic region.

The most famed achievement of the pioneering Downey missile project was the high-thrust liquid rocket engine. In 1949 an experimental engine, scaled-up from the V-2 propulsion design, was affixed to North American's rocket test stand at Santa Susana. In a graduated series of test firings, the engine eventually ranged a full 75,000 lbs. thrust for six minutes. This was the kind of power, properly scheduled, that could be used to achieve earth escape velocity...and there was the key to open the doorway to space. As a footnote to the propulsion development project, when early investigations into nuclear power as a possible source for propelling large boosters was found to be premature, North American diverted its Aerophysics Laboratory nuclear research staff to civil applications. These scientists put together the first water-boiler type or reactor in their Downey laboratory. It would light a flashlight.

The missile technology developments at Downey in the final years of the 1940s- autonav, supersonic structure, high thrust liquid rockets, plus assorted other subsystem creations- formed a comprehensive vision of a super weapon: a rocket-boosted, nuclear-armed, supersonic intercontinental guided missile. The concept congealed as a premier Air force program called Weapon System X-10104A- The Navaho.



If Downey can be referred to as the Cradle of the Cosmic Age, it is the Navaho that most prominently established that claim. The yield of the Navaho development was the primary source of technology for the U.S. space vehicle (notwithstanding its contributions to advanced military weapons that sustained the nation as a dominant world power privileged to undertake the challenge of space). The Navaho was to be evolved in three phases. First, a prototype cruise missile would be produced to test aerodynamics and systems. Powered by a conventional jet engine and with a landing gear for runway takeoff and landing, the cruise missile prototype was called the X-10. The second phase of the Navaho program would produce an intermediate-sized booster and ram-jet powered cruise missile, with the combination called the XSM-64. The XSM

-64 would be the flight test model for the final full-sized SM-64A Navaho weapon system. The ambition of the 1950 undertaking was astonishing. Some of its systems composition was based only on rudimentary laboratory example; much of the rest was sheet postulation.

The X-10 experimental flight research vehicle (right) was first flown in 1953, and in 27 flights at the Edwards Air Force Base and the Atlantic Missile Range over the next three years it was the pathfinder to 2000 mph flight- the first



turbojet plane to exceed twice the speed of sound, as well as the first missile to be flown completely under auto navigator control. Its canard, delta-wing, twin design can be seen in the Mach 3 B-70 bomber and it provided data example for X-15 hypersonic flight. The intermediate XSM-64 booster/cruise missile combination vehicle was entered into flight test at the Atlantic Missile Range in November 1956, and in the next six months four flights were launched.

Actually, what were technically recorded as flights were just hose loose moments off the launch stand before fiery destruction. The first flight lasted all of 26 seconds, the second vehicle stayed together for four minutes and 39 seconds; flight No. 3 just made a lurch up-



ward, and sat right down again, exploding on the launcher; and the fourth flight managed to prevail for six minutes and 12 seconds.

The XSM-64 Navaho flight test program was an agonizing episode of mechanical misfortunes and misfires, interspersed by the aforementioned flight failures. But for all of this, it was as momentous to the history of space flight as the 12 seconds of

airworthiness attained by the Wright Brothers in 1903 was to aviation. The Navaho was the embodiment of the advanced technology that produced space flight.

In fashioning the Navaho, the Downey operation underwrote much of the development of space guidance, including star tracking, and command control. The airborne digital computer, modular electronic circuitry, and tape-programmed automatic ground checkout equipment were introduced with the Navaho. The metalworking advances revolutionized airframe construction; including the technique of sculpturing the inside face of panels to form integrally-stiffened structure- machined structure was immediately adopted for the wings and wall sections of high performance aircraft and missiles.

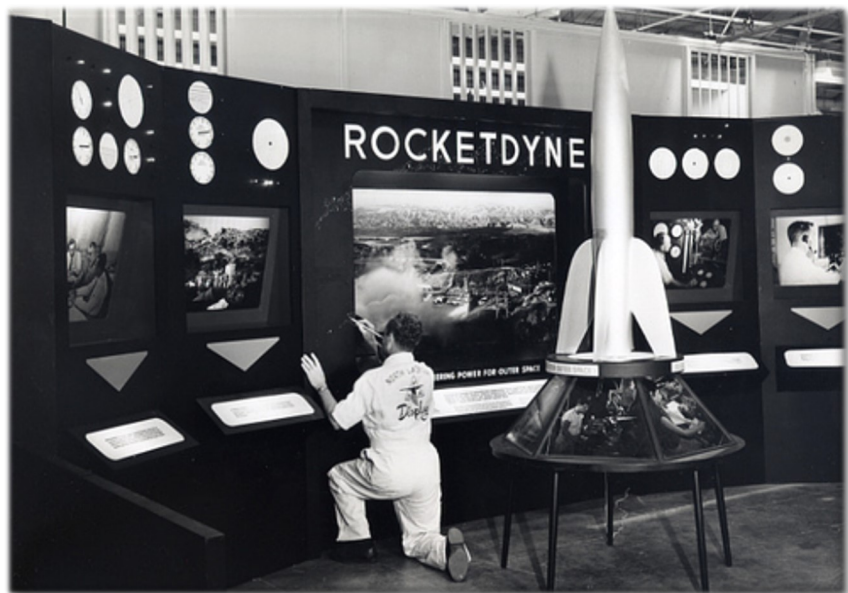
The Chem-Mill process (chemically etching metals to precise dimensions), automatic tungsten arc fusion welding and lightweight bonded honeycomb structure are a few of the great industrial contributions of the Navaho development. The propulsion systems arising out of the Navaho development were supreme. The basic Navaho liquid rocket engine was adapted to the Redstone, Jupiter, Thor and Atlas missiles and was the power of the glory of the initial U.S. space missions. When an SM-64A full-sized Navaho booster engine was test-fired at 420,000 lbs. thrust in 1956, its roar signaled the advent of heavy-weight space launch capability.

So rich were the technical discoveries of the Navaho development, that North American Aviation split out three new operating divisions to exploit the product potential. In 1955-56, the guidance project was moved into new buildings adjacent to the main Downey plant to become the Autonetics Division. The propulsion project became the Rocketdyne Division and was relocated to Canoga Park, Calif., along with the nuclear project which was named the Atomics International Division. The parent Downey operation was re-named the Missile Development Division (later just the Missile Division) and remained concentrated on vehicles.

The new divisions proceeded to their own aerospace achievements.

The Autonetics Division in just a few years became one of the largest U.S. electronics firms, successfully adapting the Navaho guidance system to the Minutemen ICBM. The Navaho auto navigation system was also translated into a Ships Inertial Navigation System (SINS), for providing precision position information on-board deep-running nuclear submarines. This SINS equipment guided the nuclear sub Nautilus on its historic under-ice cruise to the North Pole in 1958, and the system is used for targeting the Polaris and Poseidon ballistic missiles of the present nuclear submarine fleet.

The Rocketdyne Division became the near-exclusive source for large liquid rocket engines for space and defense. Navaho-original propulsion systems powered approximately 90% of the nation's half-dozen years of the space race, notably including the Jupiter C orbiting of the first U.S. satellite, Explorer I, and the Redstone and Atlas flights of Project Mercury that first put American astronauts in space. All the engines of the giant Saturn V moon rocket were built by Rocketdyne and were direct descendants of the Navaho propulsion system.



The Atomics International Division did not grow so large as its sisters (peak, Autonetics had 35,000), but it did establish a brand name in commercial nuclear utility power, and following-through with its Downey research produced the first nuclear reactor to operate in space, the SNAP IOA auxiliary power unit.

Not long after the new divisions were formed in Downey, the fathering Missile Division nearly perished. In July 1957 the government suddenly cancelled the Navaho program. Up till then the Navaho development had been producing its technical spectaculars at program costs averaging about \$100 million a year, but the Eisenhower administration embarked on a wave of austerity in defense spending and a military policy based on ballistic missile massive retaliation. The shrinking of hydrogen warhead size had made the nuclear ICBM feasible, and since the Navaho was an aerodynamic rather than a ballistic missile it was eliminated.

Four thousand of the 11,000 Downey workers were immediately dismissed. The operation had been so fully applied to the Navaho program that it had no other business activity to fall back on. Always stretching, it had been dabbling in some wild schemes such as a one-man submarine, autogyro logistics landing systems and some space flight fancy, but nothing really resembling a product.

The pain of Navaho cancellation was just a heart skip, though, because three months later the Downey plant won a major new missile program- the Air Force Hound Dog air-to-ground weapon.

The Navaho itself was permitted a final gesture. A Fly Five exercise to expend the XSM-64 vehicles that were through production at time of program cancellation was authorized. On one of these final flights a 500-mile mission was flown at Mach 3 (2,000 mph), the longest steady soak in the fierce thermodynamic environment to that time; on another, a distance of 1,075 nautical miles was flown under auto navigator control. More consequential than the successful flight exhibits, North American was given a series of Off-shoot Studies to apply Navaho technology to space objectives.

Through the last two years of the 1950s, the Downey plant membership was bent quietly to the tasks of the Hound Dog missile development. It was a severely pressured assignment, for the Hound Dog (right), an ungainly looking jet-engine nuclear missile built around the Navaho guidance system was in demand as the prime strike weapon of the Strategic Air Command's B-52 airborne deterrent force.



While nearly all of the Downey Missile Division was addressed to the Hound Dog program, there were a few small groups off in far corners pursuing space concepts. Imaginative plans were being conceived for such ambitions as an instrument capsule to be rocket-shot to the moon, an electric-engined Mars probe vehicle and a base camp for lunar exploration.

In 1958, christening one of its frame outbuildings as the Aerospace Laboratory, a handful of Downey scientists were engaging in intensive research of space disciplines in has dynamics, lunar geology (selenology), celestial mechanics and extra terrestrial life science. They were developing apparatus to support their research, including an electro-dynamics gun for simulating the impact of micrometeorites on spacecraft structure, a chamber for reproducing space conditions at Mach 20 and 400,000 feet altitude, a centrifuge for studying plant biological effects in zero-gravity, and an exact scale relief model of the lunar orb.

Heading into the 1960 decade, the Downey Missile Division business was 98% Hound Dog weapon, and its space work was somewhere in the other 2% of contracted sales. However, it would be soon working its way out of business as it delivered Hound Dogs and there were no other major missile programs in sight.



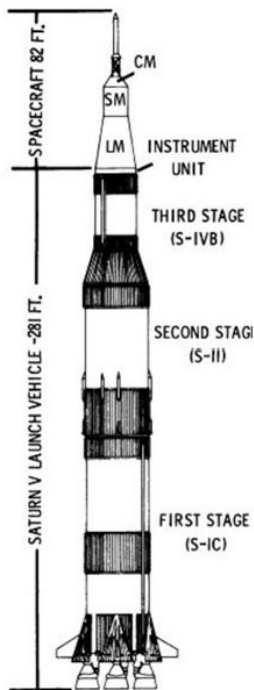
In December 1960, Lee Atwood, North American Aviation's corporate president, and an astute master of aviation and aerospace progress, re-organized the Downey division to position for the future.

The Missile Division name was dropped and replaced with an appellation not bound by dimension: the Space & Information Systems Division, reduced in acronym to S&ID. To supplement the existing Downey technical roster, the development team of the greatly successful X-15 was transferred in from the North American Los Angeles Division; advanced programs management from the Columbus Division and launch vehicle experts from Rocketdyne were added; about 50 advanced degree scientists from various corporate laboratories were also brought into the S&ID organization. The Downey plant that received these new principals was certainly far removed from the swank and gloss of the new

glamour space industries. Inside and out the buildings were dreadfully run-down. Collections of battered furniture were crammed into gloomy offices, residue of projects past lingered in dark interior passage-ways, the pallid green paint of all walls and exterior was peeling badly. Before anything else, the new management directed a wholesale refurbishment of the physical properties. With only 5000 employees finishing off a single contract and sales down to \$78 million, they could well have been dressing Downey facilities for its own funeral.

In May 1961, President John F. Kennedy, grasping for something - anything! - That would congregate national vigor and prime the economy, issued a proclamation calling for "...a new American enterprise, that of placing a man on the moon and returning him before the decade is out."

At the time of the declaration of the lunar landing goal, the U.S. manned space experience amounted to roughly 15 minutes of Alan Shepard's sub orbital lob in the first Project Mercury flight; John Glenn's first orbit was still nine months away. No one knew about the presence of radiation along the lunar space way, nor of the physiological effects of weightlessness on humans. And even if the lunar journey could be accomplished, would the landing spacecraft sink into the frothy or deep-dust moon surface that the scientists were predicting?



The Downey missile operation, now advertising itself as the Space & Information Systems Division, proposed and was accepted as a qualified bidder for the Saturn S-II launch vehicle system, the massive mid-stage for a family of NASA super booster concepts for launching multi-ton payloads into space.

The Saturn S-II was the richest prize so far to be offered in the ordained National Space Program and it was integral in the Apollo space vehicle which would essay the lunar mission. The S&ID proposal team, a coupling of seasoned Navaho engineers and newcomers from other North American divisions submitted its bid and in September 1961 the space agency selected S&ID as the S-II contractor. The Downey plant was suddenly in the forefront of space plans. It would

survive; it would even grow some.

The winning of the Saturn S-II prime contract also forced a tough business decision, for while the S-II proposal had been in submittal, S&ID was preparing a bid for the Project Apollo Spacecraft Development Program, encompassing the man-carrying command module and attached service module. The Apollo Spacecraft program engendered the greatest technological task in history.





Since it had gained the S-II major program, the hope for being awarded the Apollo spacecraft contract seemed eclipsed. It was unlikely that NASA would give one company two of the largest slices of the Apollo pie. But North American President Lee Atwood, sensing uncommon project energy, allowed S&ID management their bold chance to bid. In November 1961, less than three months after gaining the S-II program, S&ID was picked to be the principal contractor for the Apollo spacecraft development.

Downey was now the industrial center for the lunar mission. The race to the space goal at Downey became phenomena of growth. In the first year of the Saturn/Apollo work, S&ID employment nearly tripled to 16,000, then grew to 22,000 the next year, and reached 35,000 by the end of 1964- 25,000 of these working at the Downey main plant and Southern California environs.

The space hardware engineering, construction and test were feverish. There were 20,000 companies, from the biggest aerospace powers to modest backroom shops, involved in the Apollo effort, plus hundreds of laboratories and universities, all outpouring components and data to fold into the Apollo plan, with most of this funneling to the Downey end products.

In four years the S&ID facilities had quintupled to more than five million square feet of offices and factories- adding new buildings on the Downey plant site, on bordering streets, in surrounding suburbs, and out of state to a Tulsa, Okla., overflow plant and to test sites along a crescent trail leading to Cape Kennedy. The crush of people at Downey was not limited to company employees. An army of visitors- NASA personnel, subcontractor representatives, newsmen, junketing scientists and government officials, were continuously at the Downey scene.



In 1964, following an initial cut in the space budget, the euphoria of growth began to subside. By 1966 the peak of Apollo development was passed, and when NASA was forced to defer an Apollo Applications Program which would have utilized the spacecraft for extensive missions beyond the lunar landing, the Downey activity diminished almost as quickly as it had grown. The unmanned Apollo test flights

in the mid-sixties were marked successes, but in January 1967 a fatal fire in the first manned spacecraft on the launch pad interceded all plans for an early lunar mission.

As Apollo is recognized as man's highest engineering and industrial accomplishment, then it should be understood that it had to be a most difficult labor. The government and industry team had been driving itself exhaustingly for five years to achieve a manned flight, only to reach anguish in a ground fire. The Downey Apollo team grimly set out to correct any possible flaw in the spacecraft design, assembly and plan. Within a year, the first Apollo manned mission was ready and was successful in earth orbital flight. In December 1968 Apollo 8 circumnavigated the moon. After an Apollo 9 flight checked out the lunar module, Apollo 10 again skirted the moon. On July 20, 1969 Apollo 11 achieved the lunar landing. There had been heroics in the Apollo program, and much of these in the Downey effort.

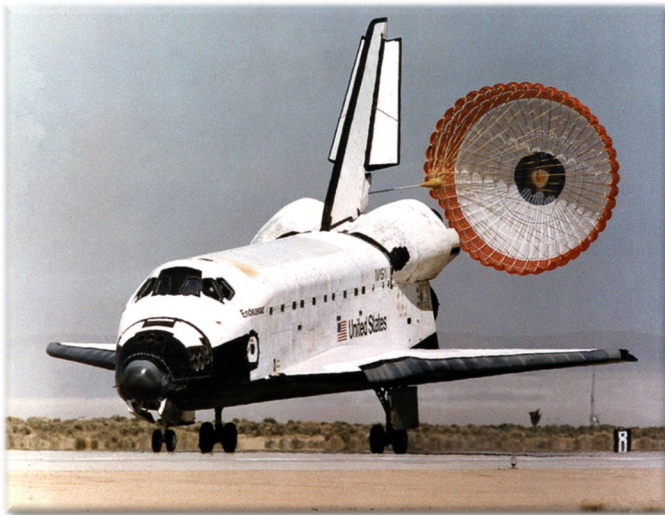


With no new space programs declared and the dwindling of the Apollo industrial requirement, the off-site buildings were released and by 1970 the Downey plant population was down to 600. It was called the North American Rockwell space Division now (North American Aviation, Inc., had merged with Rockwell-Standard Corporation, a diversified commercial manufacturer, in 1967), and there was talk that the company would settle for a lesser space activity at a newer facility in

nearby Seal Beach. But the Downey plant persisted in its space destiny. In July 1972 the North American Rockwell Space Division bid and won the NASA contract to develop and build the new Space Shuttle Orbiter vehicle. The Space Division had followed through from an original 1962 concept for a large orbital transport called the Hypersonic Research Vehicle and was now back in business with a space program with the magnitude of challenge of Apollo.

The Apollo work also was extended beyond the string of successful lunar missions with the craft being used as a ferry to the Skylab space station and for the Apollo-Soyuz Test Program (above), a joint U.S.-Russian link-up in 1972, and its space presence was widened by the award of the Navistar Global Positioning System satellite program, to be developed at the Seal Beach extension of the Downey operation. The satellite capability had been derived from earlier Downey research in information systems sensors.

The resurgent Downey operation, at a much more deliberate pace, achieved the Orbiter development by 1978 and demonstrated successful free-flight landing tests. But complications stemming from tight funding which deferred development testing in some critical areas set back the launch date to 1981.



The Space Shuttle (left) with a successful initial flight promises to become the first settler of the space frontier.

There are visions of designs now in Downey that will utilize the Orbiter's transport capability to erect large space stations, afloat in the sky as scientific and manufacturing communities. Thus, the colonization of space may also have begun with the Shuttle Orbiter on the proud ground of Downey- where the space booster and space population were first conceived, where the Navaho and Apollo

command module were developed and built.

Where should be the U.S. space shrines? At a field near Auburn, Mass., where Robert H. Goddard fired the first liquid propulsion rocket in 1926; at White Sands, N.M., where most of the early postwar missile testing was conducted and near-space first brushed; at Cape Kennedy, Fla., where the first space missions were gloriously launched? Or maybe the Langley Research Center in Virginia where the Apollo plan was conceived or possibly Houston, Texas, where the first message from men on the moon was received? There are so many, so many significant landmarks along the way to U.S. space capability. **Downey?**



Perhaps Downey is the most consequential of all. The plant has been integral in the U.S. missile and space effort from the beginning. It has been a creative source of space vehicle concepts. It has been the crucible for dramatically advanced space hardware. It has performed down at the whip crack end of responsibility for engineering and manufacturing to give substance to the space dream. From Downey, America went into space and to the moon and soon to commerce and habitation in the cosmos.

Photo above right: The "Rotunda", main entrance to Vultee Aircraft, Downey in 1940's.*

*The Rotunda and the "Kaufmann Wing" still stand at 12214 Lakewood Boulevard in Downey, California. The original EMSCO building (front section) also still stands just to the left of the rotunda.

ALF is confident a portion of this will make an ideal "visitor center" with offices and aerospace archive.

Nearly every visitor "touring" ST&SG facilities has common questions over and beyond the Space Shuttle, Navistar and other programs. They ask..."just how big is this place? How many people work here? The Downey plant is like a city, isn't it?" Here are some answers provided by Industrial Engineering and Plant Services. It might be worth clipping out and tucking away for future reference.

	Downey	Seal Beach	Palmdale
Square feet of floor space	2,347,000 sq. ft.	439,000 sq. ft.	207,000 sq. ft.
Number of acres	167.8 acres	96.7 acres	16.3 acres
Approx. Number of Employees	11,900	1,540	1,050
Electrical power to Support	11,400 homes	7,000 homes	1,334 homes
Amount of electrical Wiring	10 million feet	5 million feet	3 million feet
Air conditioning	10,816 tons	1,850 tons	520 tons
Miles of plumbing	6 miles	1 mile	$\frac{3}{4}$ miles
Miles of sewer lines	16 miles	$\frac{3}{4}$ mile	$\frac{1}{3}$ mile
Number of telephones	5,574	1,300	427
Annual use of water	83.7 million gal.	23.1 million Gal.	--- --- --- --

In use at all three facilities are 31,951 pieces of machinery and equipment.

The End

Author:

Russ Murray was a marketing and proposal presentation specialist who has written extensively on Rockwell's aviation and space heritage.

His book, "[*Lee Atwood: Dean of Aerospace*](#)," was sold through the Rockwell Management Club. His other publications include "[*The Columbus Experiment*](#)," "[*Dutch Kindelberger*](#)," and "[*Storming The Gates of Space*](#)."

Murray came to the Downey space operations in 1961 to be principal writer for the Saturn S-II and Apollo spacecraft proposals, and subsequently conceived and helped implement a new business system that featured a computer-mechanized Program Information Center and was processing over 400 proposals per year.

A graduate of the University of Pittsburgh, he joined the company at the Columbus Division in 1953, and was with the corporate Advanced Development Office from 1968 to 1970. He has been a marketing/proposal staff member or consultant for a number of companies, including Hughes, Atlantic Research, TRW, McDonnell Douglas, Brunswick and Northrop. He returned to Rockwell in 1978 and was with the SO/I&SSD Business Development Department.

Prolog – 2007

By Gerald Blackburn

President, Aerospace Legacy Foundation

Since this article was written an additional 30 years have been added to the history of this remarkable site. North American Rockwell successfully won prime contractor of the Space Shuttle Orbiter from NASA and designed and built six vehicles at the Downey and Palmdale sites. They lost the International Space Station contract proposal to Boeing. Ironically they would come together as one company in 1996.

In 1998 the Boeing Company decided to consolidate business sites and announced their intent to leave Downey. NASA began the process of disposal of the Downey site through the GSA. The City of Downey was given first options on the purchase of the property. The property remained vacant and in limbo for over three years. Subsequent sale and redevelopment of the 160 acres has resulted in several new re-births at the old site.

The acreage north of the Building 1 is now a successful retail development called **“Downey Landing”**. The prime center parcel including; Building 1 (the Vultee and North American production facility), Building 6 (North American/Rockwell design facility) and Building 290 (Apollo and Shuttle final assembly areas) are now the **“Downey Studios”**, the property is owned by the Industrial Realty Group. The 13 acres south of Building 290 have been retained by the City of Downey as the new **“Discovery Sports Complex”** which will serve as a community park and the new site of the **“Columbia Memorial Space Center”**

The southeast portion of the property was sold to Kaiser Permanente Hospital and is the site of a new hospital, office and medical center complex.

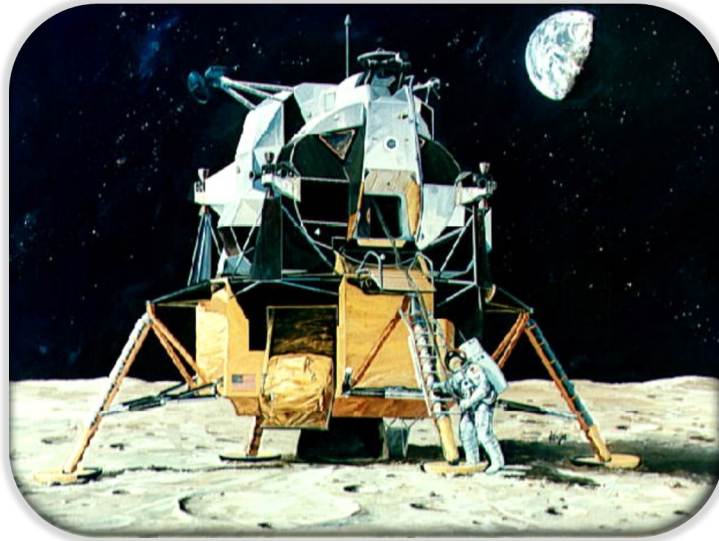
Prolog-2016

By Larry Latimer, President ALF

The NASA Industrial Plant, Downey California has been torn down. Only the historic Kaufmann Wing, Rotunda and small portion of Building 1 (EMSCO) exists. A majority of the buildings were demolished in 2013-2014 and The Promenade at Downey now comprises much of the original NASA Industrial Site. Ground-breaking took place in November, 2013.

ALF and others have a dialogue with the developers and are working to help integrate the site's incredible history into the re-use of the historic Kaufmann Wing, Rotunda and EMSCO Building (1929).

A considerable amount of retrofitting is needed to re-use these buildings.



Cradle of the Cosmic Age

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