Recertification Program Helps Prevent Catastrophic Explosions

In April of 1971, part of the heavy concrete floor and ceiling and window panels in the Propulsion Systems Laboratory Equipment Building were ripped open when an exhaust header exploded. Because the blast occurred in the pre-dawn hours, only one person was injured. A mechanic walking outside the building suffered a broken arm when he was struck by a small piece of flying concrete. Had the explosion occurred later in the day, the number of injuries could have been greater.

In 1976, NASA Headquarters’ Office of Safety and Environmental Health issued guidelines for in-service inspection of ground-based pressure vessels and systems that were directed to develop recertification programs. Currently, Lewis is in the fifth year of a five-year recertification program designed to identify, evaluate, document, and certify those systems which have the largest potential for injury and damage.

Why Recertify?
Recertification is defined as the procedure by which a previously certified vessel or system is determined to be qualified to operate at the designed (or rerated) pressure. Appropriate tests, inspections, and documentation are used in making such determinations. When the first facilities at Lewis were built in the 1940’s, construction proceeded quickly to meet the needs of the war effort. As a result, in some cases analyses and documentation about how the first pressure systems were designed, built, and certified are inadequate. Also, over the years, new systems have been added and the original systems have undergone extensive modifications to meet the changing needs of Lewis’ programs.

Scope And Purpose
The Lewis recertification inventory currently contains 117 pressurized systems, 416 pressure vessels, 27 altitude exhaust coolers, 638 relief devices, and 360 expansion joints.

Four-Step Process
1. Identification includes defining each system and its components, such as pressure vessels, relief devices, coolers, and expansion joints. This step also involves gathering data such as: system components, pressure, temperature, and cyclic operation; kind of fabrication material used, such as carbon steel or stainless steel; and the type of assembly, such as welded or flanged.

Evaluation involves comparing the certification records for each system from the time of its installation with the system’s current configuration. If this documentation is missing or incomplete, it is obtained from manufacturers or equivalent documentation is generated.

Certification includes visual inspection and nondestructive tests such as radiography, ultrasonic, and magnetic particle testing, or a recommended combination of such tests. All data obtained from these inspections are

In 1971, the pre-dawn explosion of an exhaust header in the Propulsion Systems Laboratory Equipment Building caused substantial damage to the heavy concrete floor and ceiling and window panels. The recertification program currently underway at Lewis is designed to prevent similar incidents in the future.
properly documented, as prescribed by approved certification guidelines.

A computer data bank has been established to store and manage this vast amount of information. For each component or system found to be in need of repairs is projected through the Lewis Construction of Facilities Program or institutional funding plan.

Cooperative Effort

Because the work is so extensive and detailed, numerous NASA and contractor employees are involved.

The Facilities Engineering Division manages the recertification program. Recertification Program Manager Jim DeRaiolo handles the details of program management and oversees the work of the engineering service organization.

The contractor, O'Donnell and Associates, conducts field surveys, collects existing engineering data, updates existing drawings and schematics, prepares new system drawings if necessary, performs engineering evaluations, provides engineering/safety reports, recommends recertification requirements, prepares nondestructive testing specifications, performs nondestructive testing, and prepares final recertification documentation. The firm also provides engineering assistance for updating the recertification data bank.

The Facilities Operations and Maintenance Division is responsible for shutting down scheduling, arranging for necessary emergency repairs to be made by on-site qualified personnel, coordinating the ongoing inspections and modifications, and arranging for follow-up inspections and recertification.

The Computer Services Division catalogues all the accumulated data, maintains and cross-references it so that it's programmed for convenient retrieval. The Computer Services Division has also helped develop a "tickler" file system for follow-up inspections.

Space Technology Brings New Findings On Ancient Maya

Satellite images of Mexico's Yucatan Peninsula, Central Guatemala, and Belize have led to new discoveries about ancient Maya settlement patterns, environmental setting, and natural resource use.

NASA scientists have found evidence of an ancient river plain, sea level changes, and tectonic fault lines, which may have been important geographic elements shaping the ancient Maya civilization. The satellite imagery is also being used to detect Maya water sources, such as a natural wells and ponds, and compare with historical locations to those of ancient Maya ruins.

Noted for its elaborate temples, advanced mathematics and astronomy, and large-scale architecture, the Maya civilization spread across Central America from 2000 BC until the Spanish conquest in the 16th century. Investigations will help explain how the Maya built a sophisticated civilization in a relatively resource-poor environment. They also hope to understand the mysterious cycles of expansion and decline that characterized the Maya civilization. Many scholars believe that environmental problems, including the misuse of resources, may have led to the periods of decline.

While remote sensing has been widely used to search for archaeological sites, the Ames project is the first to use space technology to attempt to understand an ancient civilization by studying its environment.

The Ames archaeological remote sensing project stems from NASA's interest in demonstrating the applications of space technology to a wide variety of disciplines. The project also reflects NASA's growing emphasis on applying space technology to studying the Earth's surface and the problems involved in maintaining a stable, life-sustaining environment on Earth.

International Space Research Program Underway In Greenland

An international space science research program, named the 1987 Greenland-I Cooperative Observations of Polar Electrodyamics (COPEP), plans to launch ten suborbital rockets from So/ndre Strømfjord, Greenland. The launch operations began last month and will continue until early April.

The program is being conducted by NASA in cooperation with the Air Force Geophysics Laboratory (AFLG), the Danish Meteorological Institute (DMI), and the National Science Foundation.

The program objective is to better understand the Sun's outer atmosphere and how it affects the near-space environment of Earth, as well as the Earth's atmosphere. Scientists expect to gather new knowledge about Sun-Earth relationships and fundamental plasma processes in Earth's space environment. The program will employ ten sub-orbital rockets and airborne and ground-based measurement systems.

Five rocket-borne experiments will release chemicals creating artificial vapor clouds above 150 miles altitude visible over a 500-mile radius from the launch site.

Greenland is considered unique for these scientific investigations because of its access to the auroral oval, polar cap, and polar cusp; its existing rocket range; support from an extensive array of scientific ground observing stations in Greenland, Scandinavia, and North America; and a broad choice of launch azimuths.

Last summer, personnel from Goddard-Wallops Flight Facility installed an international ground support equipment, radar, telemetry and communications systems. Vehicle and payload assembly structures were erected and the Danish launch facility at So/ndre Strømfjord was expanded and improved.

Payload experimenters represent NASA, AFLG, DMI, Cornell University, Danish Space Research Institute, Utah State University, University of Alaska, University of Alabama-Huntsville, Clemson University, Naval Research Laboratory, Southwest Research Institute, and Franklin Research Center. Ground-based scientists represent Stanford Research Institute International, Boston University, Cornell University, Lockheed Corp., the University of Michigan, and Technology International Corp.

NASA News Briefs

NASA COSPAS/SARSAT Managers Honored By USSR

Two NASA search and rescue mission managers, Robert Lovell and Fred Flanow, were recently awarded the Yuri Gagarin medal by a space delegation from the Soviet Union. Named after the Soviet cosmonaut who was the first man in space, the Yuri Gagarin medal is awarded for outstanding achievement in astronautics.

The medal was bestowed on Lovell and Flanow in recognition of their contribution to COSPAS/SARSAT, an international search and rescue program which uses satellites to rescue people in distress. Since its inception in 1979, COSPAS/SARSAT has helped save nearly 750 lives.

Lovell has worked for NASA for 25 years. Since 1980, he has served as director, Communications Division, at Headquarters. He manages advanced communications satellite technology research and development.

Flanow joined COSPAS/SARSAT in 1982 as deputy for search and rescue missions at Goddard. He became search and rescue mission manager in 1984.

The United States, Canada, France, and the Soviet Union are the principal partners in the search and rescue program. In the United States, COSPAS/SARSAT is jointly operated by NASA, the National Oceanic and Atmospheric Administration, the Coast Guard, and the Air Force. The research and development effort for the U.S. participation in COSPAS/SARSAT is conducted at Goddard.