

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 STATUS REPORT

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	NERVA OT0250 (H.M.Henneberry)	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages and equipment performance evaluations.</p> <p>STATUS: The first liquid nitrogen data test run, under altitude conditions, was completed January 17. It was necessary to compromise some of the data channels due to excessive noise levels. Minor facility problems were experienced with the nitrogen purge system. The instrument noise has been attributed to the Rosemont temperature sensor power supply network. An instrument engineer from Rocket Systems Division has worked directly with Rosemont in attempts to eliminate this problem. Although promising results were obtained in the "laboratory", these results could not be obtained in the field installation. The nitrogen purge system problems have been corrected.</p> <p>A second liquid nitrogen data test run was attempted on January 28 and was aborted due to high noise level on approximately 60% of instrumentation channels.</p>
B-1			<p>The major facility mechanical problem encountered was apparent failure of one hydraulic pumping unit. At the current time, work is continuing on both of these problem areas.</p> <p>Other than those problems already mentioned, the major impediment to a liquid hydrogen test run is the leak-tight sealing of the Rocketdyne pump discharge valve which was found to leak at liquid nitrogen temperatures. Possible alternatives are presently under consideration to allow a liquid hydrogen test without hazarding the facility. The status of problems indicated in prior reports is as follows:</p> <ol style="list-style-type: none"> 1. The new John Zink flare design has proven to be satisfactory in two tests. 2. The tank adapter flange outer "O" ring has been sealed at liquid nitrogen temperatures; however, additional work remains to be done on the inner "O" ring seal. A second liquid nitrogen data run is scheduled for the first week of February. The date of the first liquid hydrogen test run is approximately two weeks after a successful liquid nitrogen data run.

SECTION II
PLUM BROOK ROCKET SYSTEMS DIVISION
TEST OPERATIONS REPORT
FOR THE MONTH OF
FEBRUARY 1964

B-1 HIGH ENERGY
ROCKET ENGINE
RESEARCH

NERVA
OT0250
(H.M.Henneberry)

NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages and equipment performance evaluations.

On February 12, the second liquid nitrogen data run under altitude conditions was completed. According to the Lewis project engineer, the data appeared satisfactory with the exception of the Rosemount temperature sensor channels. To reduce the noise in these signals, individual Isoplys are being installed on each Rosemount channel. This work is scheduled to be completed for the next data run. Another problem encountered during the run was the freezing of condensed steam in the nitrogen purge system regulators. This problem will be eliminated by changes to the operational procedures. Progress on problem areas indicated in prior reports is as follows:

B-1

- (1) Modifications to the instrument transmission cable grounding system has eliminated the major instrumentation noise problem which caused the cancellation of the January 28 test.
- (2) The tank adapter flange was removed, inspected, the damaged inner "O" ring was replaced, and reassembled. The unit will be pressure-checked at cryogenic temperatures prior to the reinstalling of the pump inlet piping. Installation of the "O" rings is difficult because of their flexibility and large diameter.
- (3) A conference was held with Lewis Personnel and the following decisions were made:
 - (a) The Rocketdyne pump discharge valve which is not sealing properly will be replaced with a 4" Hadley butterfly valve.
 - (b) General Monitors Corporation hydrogen sensors will be installed downstream of the Hadley valve to indicate leakage and control facility shutdown before unsafe conditions occur.
 - (c) An Annin hydrogen "dump" valve will be installed upstream of the Hadley valve, so that chilldown hydrogen can be dumped prior to initiating the start-up test sequence. This system will allow a more realistic initial condition in the downstream piping, nozzle and reactor. Formerly, the chilldown fluid passed through these components prior to the starting of the test sequence.

Hydrogen data run will be made about a week and a half after the delivery of the Hadley valve which is scheduled to be delivered on March 16, 1964.

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 MARCH 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;"><u>NERVA</u> OTO250 (H.M. Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages and equipment performance evaluations.</p> <p>The first liquid hydrogen data run was achieved on March 25. No major problems were encountered and a preliminary data check indicates that the data acquisition system operated satisfactorily. However, final evaluation cannot be made until the run data has been reduced.</p> <p>Prior to the March 25 liquid hydrogen run, the following facility modifications and improvements were completed:</p> <ol style="list-style-type: none"> (1) Individual "Isoplys" were installed on each Rosemont temperature channel. Checkout tests indicate the elimination of the noise previously experienced on these channels. (2) Operational procedure changes eliminated the malfunction of the exhaust duct nitrogen purge. (3) The run tank adapter flange was welded to the tank. This was necessary because all other efforts to seal this flange at cryogenic temperatures were unsuccessful. (4) The Rocketdyne pump discharge valve was replaced with a 4" Hadley butterfly valve. The system was leak checked with liquid nitrogen and significant leakage was experienced during chilldown, but a good seal was obtained after approximately 20 to 25 minutes at liquid nitrogen temperatures. (5) An Annin valve was added to dump the liquid hydrogen chilldown fluid overboard prior to test run startup. (6) A Milton Roy Co. "Hymonitor" hydrogen detector was installed at the nozzle exit to detect any hydrogen leakage past the Hadley butterfly valve during the chilldown. <p>A second hydrogen test is scheduled for the week of April 6, with successive tests scheduled for every other week.</p>

SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

APRIL 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<u>NERVA</u> <u>OT0250</u> (H.M. Henneberry)	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping tests, fluid instabilities in the engine flow passages and equipment performance evaluations.</p> <p>On April 7, a second liquid hydrogen data run was aborted after the run tank had been loaded, when the normally open Jamesbury run tank vent valve could not be fully closed. The valve seemed to be frozen, but efforts to free it with ambient purge gas failed. The apparent trouble was caused by a decrease in the Jamesbury operating pressure due to a leaky bleed valve.</p> <p>On April 22, a liquid hydrogen run was successfully made. Trouble was encountered with the run tank vent valve after the tank was loaded. The valve would close but could not be fully opened. The run was made by careful manual control of the run tank servo vent valve prior to and after the automatic sequence. The exhaust gas was ignited by the flare stack on the second stage steam ejector on this run. The present status of the facility is as follows:</p>

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 APRIL 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p>Items completed this month:</p> <ol style="list-style-type: none"> (1) The four-inch Hadley pump discharge valve was removed and a new seat installed. (Valve indicated leaking under vacuum conditions on the first liquid hydrogen run.) (2) The Hadley pump discharge valve was leak-checked with an external liquid nitrogen bath. (3) Permanent control and power wiring were installed for five high-speed movie cameras. (4) Temporary wiring for an additional TV camera was installed. (5) TV selector switch and TV tape recorder were added. <p>Problems presently being investigated:</p> <ol style="list-style-type: none"> (1) The operation of the Hadley pump discharge valve, and the reasons for leakage experienced by this valve. (Continued on Page 16) (2) The operation of the Jamesbury vent valve. <p>Items to be completed in May:</p> <ol style="list-style-type: none"> (1) The installation of a quality meter between the liquid hydrogen pump and the nuclear engine. (2) Addition of a bleed line from the pump discharge to the tank vent to facilitate a shorter pump cool down time. (3) The installation of a purge gas heater to be used to heat the engine to ambient temperature after the test run. (4) Repair of the support brackets for flare stack on 2nd-stage ejector, which were damaged by vibration on the last liquid hydrogen run. <p>Liquid hydrogen test runs are scheduled for May 6 and May 20.</p>	

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 MAY 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;"><u>NERVA</u> OT0-250 (H.M.Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages and equipment performance evaluations.</p> <p>On May 6 and May 22, the third and fourth liquid hydrogen runs were successfully completed. The May 22 run was scheduled for May 20, but had to be postponed two days because of a blockage in the two-inch discharge line on the H-8 liquid hydrogen supply dewar. Facility modifications were required so that the H-3 dewar could be used.</p> <p>Other items completed this month:</p> <ol style="list-style-type: none"> 1. Jamesbury vent valve operator was modified so that pneumatic pressure would assist the spring in opening the valve. 2. A quality meter was installed between the pump discharge valve nozzle inlet. 3. A bleed line was installed immediately upstream of the pump discharge valve to facilitate pump chilldown. 4. The brackets supporting the flares on second stage ejector were repaired. 5. Exterior painting of the test facility was completed. <p>Problems presently being investigated:</p> <ol style="list-style-type: none"> 1. The leakage of the four-inch Hadley pump discharge valve is being investigated. 2. Installation of a purge gas heater to be used to heat the engine to ambient temperature after the test run is being investigated. <p>Liquid hydrogen test runs are scheduled for June 3 and June 17.</p>

SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

JUNE 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<u>NERVA</u> OTO250 (H.M.Henneberry)	NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests fluid instabilities in the engine flow passages and equipment performance evaluations.
<p>On June 3 and June 17, liquid hydrogen runs No. 5 and No. 6 were conducted at liquid hydrogen flow rates of six pounds per second with 10 PSIG tank pressure and 14 pounds per second with 35 PSIG tank pressure.</p>			
<p>Critical startup transient data was not recorded on the June 3 run because the "H" Building data recording equipment started 24 seconds late. The cause of the delayed start is unknown and the system has been repeatedly checked and it operated correctly for the June 17th run. Startup transients of the June 3 type will be repeated in future tests.</p>			
<p>During the June 3 run, oscillations were observed on the pump inlet flowmeter, pump interseal gaseous helium purge pressure, and the pump aft bearing temperature. Following the run, the inlet flowmeter was removed and checked. The bearings showed considerable wear and they were replaced. The three instrument channels that were involved were checked for cross-talk, but none was found.</p>			
<p>On the June 17th run the pump interseal purge was turned off and no oscillations were experienced. It was speculated therefore that the oscillations were caused by the pump interseal bleed; further investigation to verify this will be made on the run of July 1. Following the June 17 run, the pump exit Venturi flowmeter was removed and sent to Lewis for recalibration for the next run.</p>			
<p>Items completed and items worked on in June:</p>			
<ol style="list-style-type: none"> (1) A general Monitors Company gaseous hydrogen detector was evaluated at Plum Brook for potential use as a hydrogen leak detector in inert atmospheres; this preliminary evaluation indicated the unit was not suitable for this application. Further consultation will be made with General Monitors personnel. Use of a modified MSA unit is now being investigated. (2) Hydraulic and gaseous helium regulator system on pump package was relocated to improve TV viewing of pump turbine shaft. (3) Rehabilitation of Boilers #2 and #4 is nearing completion. When completed, capacity of the Boiler House will be doubled, resulting in shorter time periods for charging steam accumulators. 			
<p>Liquid hydrogen test runs are scheduled for July 1, 15 and 29.</p>			
<p>NOTE (A): Schedules changed due to program re-evaluation. After startup transient tests with the present system are completed, one bootstrap test will be made prior to changing to flight weight piping system configura-</p>			

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 JULY 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;"><u>NERVA</u> (T1011)</p> <p>(H. M. Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages, and equipment performance evaluations.</p> <p>On July 1 and July 15, liquid hydrogen runs No. 7 and No. 8 were successfully conducted. Test Run No. 7 was conducted at a tank pressure of 10 PSIG with a maximum flow rate of $5\frac{1}{2}$ #/sec. Test Run No. 8 was conducted with the liquid hydrogen pump rotor locked to determine torque generated in pump due to liquid hydrogen flow. Tank pressure was ramped to 55 PSIG with a maximum flow rate of $9\frac{1}{2}$ #/sec. All previous tests had been conducted with the liquid hydrogen pump free to windmill.</p> <p>Oscillations, as noted in the June Status Report, were experienced again on the run of July 1, with the pump gaseous helium interseal purge energized or de-energized. The run of July 15 was conducted after an increased chill-down period in an attempt to eliminate these oscillations without success. At the present time, the cause of these oscillations is unknown and further investigation is required.</p> <p>On July 29, liquid hydrogen run No. 9 was attempted. Approximately eight hours was spent in attempting to define the performance requirements for the pump discharge servo valve.</p>

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH		<p>After this requirement was established, the remaining work which still had to be accomplished prior to running was considered excessive so the run was cancelled.</p> <p>Items worked on in July:</p> <ol style="list-style-type: none"> (1) A static torquemeter was temporarily installed on the pump rotor for fit-up, sent to Lewis Research Center for application of strain gauges, and upon its return installed in system for Run No. 8. (2) The Rocketdyne liquid hydrogen bypass servo valve was removed due to a seal leak and replaced with a new valve. The damaged valve was returned to Rocketdyne for repair. (3) The gaseous nitrogen heater installation was completed and checked out. (4) After the test run of July 15, the temperatures of the reactor, nozzle and several propellant piping components were monitored to obtain a history of their normal warm-up characteristics. (5) Two additional hi-speed Fastex movie cameras are being installed for the next run. <p>Liquid hydrogen test runs are scheduled for August 12 and August 26.</p> <p>Startup transient program will be completed with the run of August 26. The first "bootstrap" test will be made September 16, after installation of new control system for turbine, between August 26 and September 16. Between September 16 and September 30, new flight weight piping system will be installed and the remainder of tests made with this system.</p>

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 AUGUST 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;">NERVA (T10T1) (H.M. Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages, and equipment performance evaluations.</p> <p>On August 12, liquid hydrogen run No. 9 was successfully completed. The test was made with a tank pressure of 35 PSIG and the pump discharge valve was ramped to a maximum opening of 18%. The maximum flow rate attained was 5#/sec. "Pips" in the tank discharge flowmeter data were negligible on this run. The disappearance of these "pips" is attributed to the extended pump chilldown.</p> <p>The test run scheduled for August 26 was cancelled by the Research Project Engineer because additional cooldown data was not needed, and the time could more effectively be used to make modifications for the bootstrap tests.</p> <p>Items worked on in August:</p> <ol style="list-style-type: none"> (1) Contractor tie-in of "B-3" exhaust duct to the "B-1" system was started. (2) Flanges on the 96" butterfly valve in "B-1" exhaust duct were seal welded to repair a leak in the flange joint. (3) The torquemeter was removed from the Mark IX turbo pump. A new shaft will be installed and then the assembly will be reinstalled. (4) Modifications to servo-control systems necessary for bootstrap tests were started. (5) After the test run of August 12, ambient temperature gaseous nitrogen was passed through the nozzle and reactor to determine warm-up characteristics. <p>Liquid hydrogen test runs are scheduled for September 16 and September 30. After the September 16 bootstrap run, the piping from the pump discharge to nozzle inlet will be changed to flight weight piping. The September 30 run will be the last cooldown test with the present test equipment.</p>

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 SEPTEMBER 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;"><u>NERVA</u> (T1011) (H.M.Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages, and equipment performance evaluations.</p> <p>On September 21, 1964, liquid hydrogen Run #10 was completed. This run was delayed from September 16 to September 21 because the bellows in the turbine inlet line was leaking and had to be replaced. This run was the first attempt to "bootstrap" the Mark IX turbo pump. The turbo pump "bootstrapped" with a maximum LH₂ flow rate of 18#/sec. at a speed of 4,300 RPM. The test results were of limited value due to the following:</p> <ol style="list-style-type: none"> 1. Run duration was short due to insufficient LH₂ supply to fill run tank prior to run. 2. Several important channels of instrumentation were not recorded. <p>On September 30, Run #11 was successfully completed. The turbo pump 'bootstrapped' with a LH₂ flow rate of 26 #/sec. at 7,000 RPM. Complete results of this test are not available since no data has been reduced at this time.</p> <p>The piping from the pump discharge to the nozzle inlet has not been replaced with flight weight piping due to late delivery of component parts.</p> <p>This piping is currently scheduled to be installed the week of October 19, 1964. LH₂ runs are scheduled for October 14 and October 28.</p>

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 OCTOBER 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;"><u>NERVA</u> (OT1011) (H.M.Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages, and equipment performance evaluations.</p> <p>On October 15, the third Mark IX Turbopump Bootstrap Test was completed (Run #12). The maximum flow rate was 26# per second at 7600 RPM. All test objectives were successfully met. This test run was delayed a few hours due to excessive pressure drop across the filter in the turbine lube oil system. After the run, the lube oil system was checked. It was found that the oil contained a large amount of carbon particles. These particles apparently were from the turbine seals. The oil system was cleaned and put back into service. A further investigation of this problem is being made. The pump discharge piping to nozzle inlet was replaced with Schedule 5 piping, lightweight flanges and gimbals.</p> <p>On October 22 through 28, a series of steam ejector tests were made to determine the ejector air pumping capacity at design and reduced steam pressures. The data was reduced and a report has been published.</p> <p>On October 30, Run #13 was successfully completed. This run was a chilldown test with no power being applied to the turbine. A maximum flow rate of 10# per second was attained with a pump speed of 3000 RPM. The test data for this run has not been reduced.</p> <p>NOTE: Liquid hydrogen runs are scheduled for November 12 and November 25.</p>

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 NOVEMBER 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;">NERVA (OT1011) (H.M. Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages, and equipment performance evaluations.</p> <p>A planning meeting was held on November 6 with the Lewis Research personnel. The Mark IX turbo pump testing was scheduled for every two weeks until March 3, 1965. The Mark III turbo pump was scheduled to be installed after the Mark IX tests. Approximately six to eight weeks will be required to install the Mark III turbo pump and to accomplish the following items:</p> <ol style="list-style-type: none"> (1) Installation of the SEL equipment and the expansion of the "B-1" Test Stand instrument terminal room. (2) Installation of a burnoff line from pump discharge to either test stand roof or ground level. (3) Installation of a liquid hydrogen transfer line from the 200,000 gallon storage tank to "B-1". (4) Installation of a new steam pressure control system. <p>It was also decided at this meeting that the 20,000 gallon liquid hydrogen run tank would not be installed during this shutdown.</p> <p>On November 12, liquid hydrogen Run No. 14 was successfully completed and all the test objectives were attained. The maximum flow rate was 21#/sec. at 6300 RPM. This run was the first of a series of bootstrap tests with lightweight piping installed between the pump discharge and the nozzle inlet.</p> <p>On November 18, while attempting to calibrate the torque-meter, the turbine lube oil sprayed out the turbine exit, indicating the failure of the carbon seals. This confirmed the conclusions made in the October status report. A spare turbine is being installed and the defective unit will be returned to Rocketdyne. Because of this problem, Run #15 had to be rescheduled from November 25 to December 9.</p>

SECTION II
 PLUM BROOK ROCKET SYSTEMS DIVISION
 TEST OPERATIONS REPORT
 FOR THE MONTH OF
 DECEMBER 1964

SITE	LABORATORY	RESEARCH INSTALLATIONS (FOR)	DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE RESEARCH	<p style="text-align: center;"><u>NERVA</u> (OT1011) H.M.Henneberry)</p>	<p>NERVA engine propellant feed system tests. The investigation will include turbopump "bootstrapping" tests, fluid instabilities in the engine flow passages, and equipment performance evaluations.</p> <p>On December 9, Liquid Hydrogen run No. 15 was made. The turbine speed could not be controlled, therefore the run was shut down after sixteen seconds. Investigations indicated a faulty feedback signal to the speed controller caused the turbine power control valve to go to the full open position.</p> <p>On December 22, Liquid Hydrogen run No. 16 was completed. A maximum hydrogen flow rate of twenty-nine pounds per second was obtained at a pump speed of 9000 RPM. Most of the systems functioned properly, however, the pump speed/flow control loop was unstable and caused the turbine pressure control valve to oscillate. This problem is being analyzed.</p> <p>Facility work that was accomplished in December:</p> <ol style="list-style-type: none"> (1) The new turbine installation was completed. (2) Additional instrumentation and a camera port were installed in the liquid hydrogen line upstream of the nozzle inlet. (3) A new control system was installed for the turbine power control valve. (4) The railroad siding was completed. (5) Preliminary design was initiated for the required modifications for Block II testing. <p>NOTE: The 'Bootstrap' Tests run schedule has been extended three weeks to the end of March. This schedule change was required because Run #15 did not accomplish the research objective.</p>