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Summary of Electromagnetic Tests for High Power Radio Frequency (HPRF) Phase 2 Study (U)

J. E. Solberg

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Summary of Electromagnetic Tests for High Power Radio Frequency (HPRF) Phase 2 Study (U)

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Electromagnetic Analysis and Test Department 2753
Sandia National Laboratories
Albuquerque, New Mexico 87185-0865

Abstract (U)

In support of the High Power Radio Frequency (HPRF) Phase 2 Study, electromagnetic tests were performed at Sandia National Laboratories and Defense Nuclear Agency's electromagnetic simulators on electronic equipment.

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(U) In support of the Sandia contributions to the test effort:

DTRA

the following individuals made major

Lt.Col. Roger Colvin
FCDNA Test asset acquisition, test planning and test conduct

Bob Ketelsen
SAIC Test instrumentation and test asset repair

Bill Derr
Derr Enterprises Test instrumentation and test asset repair

Bill Tedeschi
SNL Test program planning

John Stake
SNL Test conduct and data processing

Parris Holmes
SNL Test conduct and test instrumentation

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Am memorandum

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Illustrations (U)

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1 Group One Radio Test Failures (U)	14
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Executive Summary (U)

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b6 As one of the participating organizations in the HPRF Phase 2 Study, Sandia National Laboratories conducted electromagnetic tests on foreign test assets.

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~~CONFIDENTIAL~~ As a result of the testing performed, the following general conclusions can be drawn.

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~~SECRET~~ Introduction (U)

~~SECRET~~ The HPRF Phase 2 weapon study is a joint DoD (Air Force) and DOE effort that has been active to date for 24 months of a total 30-month effort. Participants include Defense Nuclear Agency (DNA), DOE and its design laboratories, and several U.S. Air Force agencies.

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~~SECRET~~ In addition, voltage and current measurements during conduct of the tests were made to establish the stress levels at which a failure occurred. These are to be provided to the MAWG so that Foreign Asset Assessment Team (FAAT) results can be verified.

(U) In the remainder of this summary report, a brief description of each test object is given. Each test facility and the environment it provided is briefly described. Test configurations, test measurements, and test results are discussed.

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Test Objectives (U)

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In addition to determining the failure levels in volts/meter, stress level data was measured for two of the test units.

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Test Facility (U)

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Test Configurations and Measurements (U)

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(U) Additionally, one receiver (serial No. 13918) and one transceiver (serial no. 13919) from the Group One radios were instrumented with current and voltage probes. The antenna current at the base of the antenna and inside each of the radios was measured. The current on the battery cable was measured externally and internally inside each radio. The current on the audio headset cable was measured and the voltages on the audio input and output were measured inside the test units.

(U) After each test shot, a 1-kHz tone was transmitted with an IFR 1200 communications test set to the test object to confirm that it still functioned properly. After each test level, a complete test was performed with IFR 1200 communications test set to determine that no changes had occurred in transmitted frequency, power output, receiver sensitivity, modulation limiting, call tone transmittal, receiver call indicator sensitivity, or receiver squelch sensitivity.

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Test Results (U)

~~b(3)(f)~~ In Table 1 are listed the various failures that occurred

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Table 2. Group Two Radio Test Failures (U)

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Likewise, for the other failures listed in Tables 1 and 2, no direct path of energy coupling to the failed component could be identified.

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Conclusions (U)

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Test Objectives (U)

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Test Facility (U)

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Test Configurations and Measurements (U)

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Test Results (U)

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Conclusions (U)

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b(1)

These units were designed using practices that are equivalent to the late 1970's and early 1980's design practices in the United States.

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It is a modular design with predominantly discrete components. Also, the design includes analog operational amplifiers and miniature tubes.

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Test Objectives (U)

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Test Facility (U)

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Current probes and voltage probes were provided by Sandia.

Test Configurations and Measurements (U)

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~~DOE & DTRA~~

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Test Results (U)

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Conclusions (U)

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Test Objectives (U)

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Test Facility (U)

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Test Configurations and Measurements (II)

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Table 4. PU-12M Test Configurations (U)

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The radios were checked by sending RF transmissions to the antennas and the telephone line was checked with a portable telephone.

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Test Results (U)

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Conclusions (U)

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