The first funds from the subject grant were received November 5, 1995. In the meantime, plans had been made for design development, material purchasing, and testing.

DESIGN

I travelled to Alameda, California to meet with the engineers at Allied Engineering and our chosen consultant, Pius Chao. Several meetings were held regarding the basic design. The original design called for hydraulic impulse dampening supports for both the tank within which the explosion takes place, and the movable water deflecting cone which covers the tank during firing. The Hydraulics designers and manufacturers could not produce a mechanism that would react within the time of the shock wave. In times less than 100 microseconds, hydraulic supports were immovable objects. Dr. Pius Chao suggested using rubber to mitigate the shock, and mounting the explosive tank within another tank which would catch and retain the water that was not directed back into the explosive tank. Further he suggested an approach for the water deflecting device. He suggested a design that during the explosion would be stationary, and fixed to the outer tank in which the explosive tank was mounted. The interior design would resemble an automobile muffler. Gases generated by the explosion would be separated from the water, and exhausted through a port in the bottom of the outer tank. The water would be diverted to the sides, and most of it returned to the explosive tank. This design had the advantage of completely containing the water plume as well as reducing the decibel level of the sound emanating from the explosion. We decided on this new design, and directed Allied to prepare working drawings. Our patent attorney felt that this new approach had novelty, and contacted the patent department of the DOE stating that Hydrodyne would apply for a patent for this device.
DISCLAIMER

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TESTS

In order to properly design the apparatus, the time of the shock wave produced by the two part explosive used by the process had to be determined. The laboratory for the explosive manufacturer, Slurry Explosives, was retained to do the testing. Fifteen shots were fired in their facility in Kansas. The facility was adjacent to a lake where the explosions took place. Pressures of the shock wave were measured at a distance that represented the explosive tank wall, and the time period of the wave was recorded. The pressures were lower than calculated, being approximately 7000 psi, rather than 10,000 psi shown on the TNT charts. The time period of the wave was 75 microseconds.

While in the area, I visited the Lawrence Livermore Lab. which is administered by DOE. The conventional explosive test facility there is probably the best in the U.S. They held a meeting at which the results of a proposed test were discussed, and said the site would be available. The fee would be only the man hours of the personnel involved, and would be between $5000 and $10,000. This seemed reasonable. I was to write a paper describing the test, and the desired time.

TESTING AT ARS

Dr. Solomon, the chief meat scientist at ARS in Beltsville, MD who administers the CRADA between ARS and Hydrodyne recommended that we continue testing at ARS prior to completion of the Hydrodyne equipment. Interest had been expressed by several meat producers in the Hydrodyne Process. All had asked for information about the effect of the Process on the consumer acceptance of the tenderized meat. Although we had in an informal way determined that the effects were beneficial, a proper taste test panel would have to be trained, and meat processed by the Hydrodyne Process was required. We agreed to go ahead. Further he suggested we examine the effect of the process upon killing bacteria. The meat science conference in San Antonio in the summer had indicated that high pressures killed bacteria.

EXPENDITURES

Funds in the amount of $28,000 were advanced to Allied Engineering for the purchase of materials, the tests were done at Universal Tech, and pressure transducers were purchased for the proposed test at the Livermore Lab.

Sincerely,

John B. Long
Project Manager