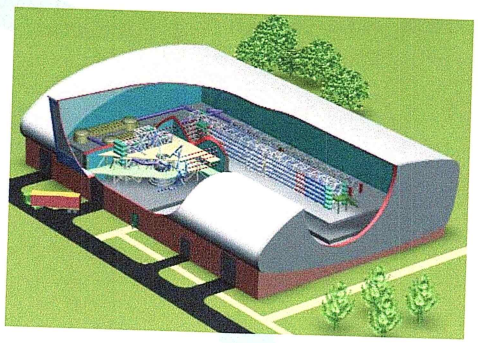
An AWE Public Information Leaflet

Sites Development **Strategy** Update 2005

If finally approved, the new laser would be 1,000 times more powerful than our existing HELEN laser and would be a major step forward in plasma physics research. It would be made available for use by the wider academic community and would thereby further improve AWE's interactions with United Kingdom universities and centres of research.

If we proceed with this project it would also become the subject of a Notice of Proposed Development and would be submitted to the West Berkshire Council Planning Authority.



A computer generated image of the proposed Laser Facility

Materials science is the study of the behaviour of materials. It is another important area of research at AWE, since a nuclear warhead contains a variety of special materials such as metals, inorganic salts, rubbers, foams, adhesives, high explosives and radioactive materials - all in close proximity.

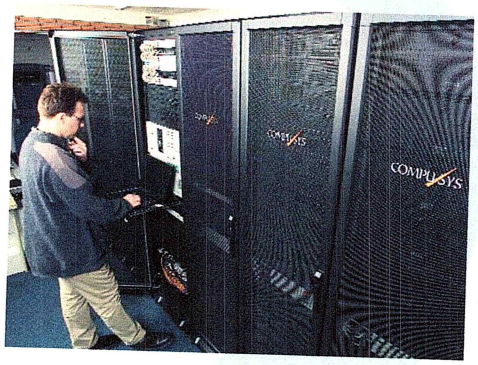
In the absence of nuclear testing our scientists are being challenged to accurately predict, by scientific means, the characteristics and performance of both new and ageing materials. This task is particularly important in the case of the Trident weapon, which has a lifetime expected to be 30 years.

We plan to consolidate our materials science work in a few state-of-the-art facilities at AWE Aldermaston and possibly at AWE Burghfield, incorporating the most modern safety, technical and energy-saving facilities. In addition to the various improvements this will achieve, it will enable us also to close and demolish a significant number of older buildings, particularly at the eastern end of the Aldermaston site.

Individual materials science facilities would also be subject to the Notice of Proposed Development procedures.

Supercomputing provides us with the ability to create the three-dimensional modelling and simulation requirements for our Physics, Engineering and Materials departments.

All of the information from our hydrodynamics and laser experiments and the data from materials studies, together with previous actual test results, are used in refining computer codes used in the mathematical modelling of nuclear weapon performance.

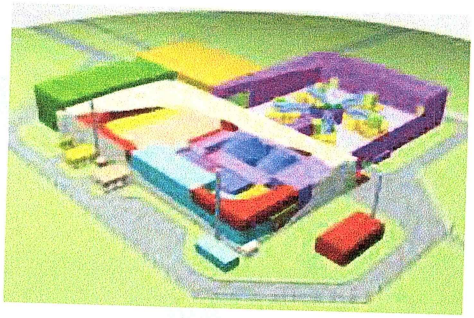


AWE's new supercomputer is capable of 3,000,000,000,000 calculations a second.

Development to support our Science Programme

Four areas of research are essential to our science programme in a nuclear test ban era - hydrodynamics, laser physics, materials studies and high-performance computing. These are the main areas for future investment to support our mission.

Hydrodynamics



A computer generated image of the proposed Hydrodynamics Research Facility

Hydrodynamics is the science of forces acting on or exerted by fluids. It is an important field of investigation for AWE's scientists since, during a nuclear explosion, materials behave like fluids as they are subjected to extremes of pressure and shock.

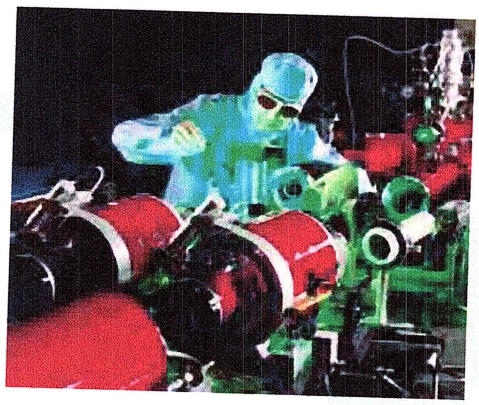
At AWE Aldermaston we conduct hydrodynamics experiments in which weapon mock-ups and small amounts of fissile material are subjected to explosive shocks. The experiments are 'photographed' by giant x-ray machines and analysed with a range of diagnostic equipment.

The experiments are conducted inside thick concrete chambers lined with steel. The chambers are fitted with sophisticated filtration equipment to ensure the safety of staff and protection of the environment.

A new Hydrodynamics Research Facility, with greatly improved diagnostics, is planned for the future. It will enable us not only to continue to certify the performance and safety of the nuclear stockpile but will also maintain our world leader status in this important field of science.

It is planned to submit a Notice of Proposed Development for this facility to the West Berkshire Council Planning Authority in due course.

Laser Physics



A technician at work on AWE's high energy HELEN Laser

High-powered lasers enable us to replicate in the laboratory the physical conditions at the heart of a nuclear explosion - albeit on a minute scale. The HELEN laser at AWE, now more than 20 years old, was the first in the world to be used for this type of experiment and AWE has led the way in research in this area.