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**Statement of Arjun Makhijani**  
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The world's leaders, especially those of the eight nuclear weapons states, face momentous decisions on nuclear weapons that they must make soon to reverse the drift to increasing nuclear dangers. One of the issues that has received very little public scrutiny relative to its potential historic magnitude is the problem of pure fusion weapons -- that is, thermonuclear weapons that do not require fissile nuclear triggers (plutonium or highly enriched uranium). Such thermonuclear weapons have not yet been developed because their scientific feasibility has not been proven. But the devices to accomplish that difficult task, which has eluded researchers for decades, either exist or are now under construction, provided they work as their designers hope. Notable examples are the US National Ignition Facility (NIF) being built at Livermore, California and a similar French facility being built near Bordeaux, France (Laser Mégajoule, or LMJ). As a result, we are at a crucial technical and legal juncture in the development of new types of nuclear weapons.

The current period is comparable to the late 1940s and early 1950s, when decisions regarding fission-triggered thermonuclear weapons were being made. Once the feasibility of such weapons was established by a 1952 US test, which was not of a deliverable weapon, the pressure to develop huge arsenals of thermonuclear weapons in the United States and the Soviet Union became inexorable.

We must prevent these new highly dangerous and destructive nuclear weapons from being developed. The time to do so is now, before their feasibility is established. Once feasibility is demonstrated, the pressures from nuclear weapons laboratories as well as the military establishment to design and build them will be immense. We have one advantage over the time when fission-triggered thermonuclear weapons were developed in the 1950s. We have a CTBT that bans all nuclear explosions.

Besides the nuclear dangers that pure fusion weapons would pose, there is an immediate question of the legality of some of the research. Unlike the NPT, the Comprehensive Test Ban

Treaty (CTBT) of 1996, which about 150 countries have signed (including the five nuclear weapons NPT signatory states), bans all nuclear explosions. Article I of the CTBT also requires parties to prevent nuclear explosions. However, the CTBT does not define such explosions and there is as yet no official ruling regarding which fusion explosions, if any, might be regarded as legal.

As my colleague Hisham Zerriffi will explain, the negotiating record regarding fission explosions as well as considerations relating to the fusion process have allowed us to come to the technical conclusion that certain laboratory nuclear fusion explosions -- those that achieve thermonuclear ignition -- would be illegal. Such illegal explosive experiments are planned for the US National Ignition Facility (NIF) and the French Laser Mégajoule (LMJ). These experiments, and hence the NIF and LMJ, appear to be illegal under the CTBT. By the same criterion, some planned joint US-Russian magnetized target fusion experiments (MTF) at Los Alamos National Laboratory in New Mexico are also illegal. It is therefore essential to stop the construction of NIF and LMJ and cancel certain MTF experiments at Los Alamos. Laser and other similarly large devices are not themselves weaponisable, but could work in combination with other approaches, like MTF, to create usable weapons. Laser fusion would be useful in establishing scientific feasibility of pure fusion weapons and for designing the fuel pellets. We should note that most current fusion research activities are legal under the CTBT, including all non-explosive magnetic fusion research and research on existing laser fusion machines, like NOVA in Livermore and GEKKO XII in Japan.

No country has actually announced the goal of building pure fusion weapons. Given the insistent international calls for nuclear disarmament and the requirement of the thirty-year-old Nuclear Non-Proliferation Treaty (NPT) that nuclear powers end the nuclear arms race at an "early date," those powers could hardly announce an explicit goal for developing pure fusion weapons.

Pure fusion weapons have long been a dream for nuclear weapons designers. Present-day thermonuclear weapons need plutonium or highly enriched uranium to set off the hydrogen-bomb part. But pure fusion weapons would not need either of these fissile materials. As a result, they would produce little fallout. They could be made very small or very huge. And the research involves interesting scientific challenges. Finally, the lethal area per unit of explosive power of relatively small pure fusion weapons would be much larger than today's nuclear weapons.

Pure fusion weapons would present far greater nuclear proliferation dangers since the acquisition of highly enriched uranium or plutonium is currently the main obstacle to proliferation. By contrast, deuterium and tritium, the forms of hydrogen used in fusion research and weapons, are less difficult to make. Verification would also be more difficult. Most

importantly, fusion weapons would likely lower the threshold for nuclear weapons use, because of their smaller individual size and relative lack of fall-out.

It is provocative and counterproductive for the United States and France to be building NIF and LMJ and planning ignition experiments at the same time they are lecturing countries like India and Pakistan to stop their nuclear weapons programs. Significantly, India announced its own stockpile stewardship program after it conducted its nuclear tests. We call for a moratorium on all explosive fusion projects and experiments designed to achieve thermonuclear ignition. Far more public debate on this crucial issue is needed, given its grave implications.

The United States is exercising a double standard in regard to India and Pakistan, since it has called upon these two countries, which have not signed the CTBT, to accede to it unconditionally. By contrast, President Clinton has attached several conditions in his transmittal letter to the US Senate asking for CTBT ratification. These currently include a stockpile stewardship program that has elements that our research shows are illegal under the CTBT.

The US double standard does not excuse or justify the tests that India did, nor Pakistan's nuclear reply. On the contrary, it is essential for India and Pakistan to sign and ratify the CTBT unconditionally. But if the United States truly wants them to do so, it should set an example and itself ratify the CTBT unconditionally.