GREENPEACE TOKAI ACCIDENT RESULTS RELEASED MITO CITY AND TOKYO, JAPAN, 7th OCTOBER 1999

Greenpeace today released the results of its investigations into environmental radioactivity around the Tokai-mura uranium conversion site, 130km north of Tokyo. It should be noted that radiation levels around the plant have now returned to normal although the plant itself is heavily contaminated. The Japanese government has stated there were 49 people exposed to radiation however Greenpeace believes there were at least several hundred.

THE ACCIDENT

The accident was so dangerous because it was a “criticality” event which means an uncontrolled nuclear chain reaction occurred with the fission (splitting of atoms releasing huge amounts of energy) of uranium in a watery solution. Approximately 16kg of uranium including 18.8% in the isotope U-235 inside a steel tank went critical after seven times the recommended amount of enriched uranium solution the recommended amount of enriched uranium was placed in the tank.

Greenpeace’s analysis shows that, since the tank is still intact, heavy elements like plutonium were not released in the environment during the accident. (plutonium is so toxic that a single speck, the size of a grain of dust, can cause cancer). There is a risk that this could happen during the 'removal' operation of the tank, but so far, only the gaseous and volatile elements have left the tank. The radioactive substances establishing there was radioactive fallout - Iodine, Cesium and some Strontium – were found around the site, as well as in the vomit of the nuclear workers most severely effected by the accident.

HEALTH RISKS

Levels of radiation and radioactive contamination measured around the plant demonstrate that this was not a release on the scale of the 1986 Chernobyl reactor accident Most of the radioactivity remains inside the tank, at least 95% Greenpeace estimate. A comprehensive environmental monitoring program is essential to accurately understand the dispersion and level of fallout. In terms of public health, there is no threshold below which radiation is considered safe. However, levels of radioactive fallout measured do not pose an immediate health risk but may effect public health over the medium to longer term. Again, from the measurements taken by Greenpeace, the effects of the radiation will almost entirely be felt by those people living in the immediate vicinity of the plant. It is impossible to say what the actual health effects will be although exposure to elevated levels of radiation is known to increase the risk of cancer. As for contamination of farm land and crops around the plant, that has occurred, harvesting of crops was halted and therefore none should enter the food chain, although again local consumption may lead to further health effects.

Full compensation to the farming community is absolutely essential, and should be paid for by the central government.

THE PRIMARY FINDINGS OF GREENPEACE'S INVESTIGATION WERE:

BACKGROUND RADIATION LEVELS

Greenpeace began measuring radioactivity around the Tokai-mura site on the late afternoon of Sunday October 3rd late afternoon Within hours we discovered that background radiation levels were not "back to normal" as stated by the Japanese government but in fact were up to five times higher, at 0.54 microSieverts per hour. The sampling team from Greenpeace Netherlands, and Germany as well as Japan, measured these levels approximately forty metres from the source of the radiation - the building in which the uranium had gone critical on Thursday 30th September. This happens to be a public highway, including a pavement where people walk and cycle.

The levels found would not be acceptable for a public space in either Germany or the Netherlands for example, in fact levels at perimeter fences in Germany if they exceed 1.3 times background (background being 0.1microSieverts), it would mean immediate closure of the area. In the case of Tokai-mura and the governments response, the area was officially declared safe by Saturday evening October 2nd, though during most of Saturday there were no restrictions or warning signs to people entering the area, particularly along Genken road, which runs along the main wall of the plant. The exclusion zone of 350 metres
Levels of background radiation on Saturday were certainly higher than those measured by Greenpeace on Sunday. Once again therefore the government and in particular the Science and Technology Agency failed to protect public health and instead sought to de-escalate the seriousness of the accident.

FALLOUT

The Japanese government stated after the accident that there had been no radioactive fallout. Once again they were wrong in their assessment, and once again they allowed people back into the area most directly contaminated before conducting a comprehensive environmental assessment.

Greenpeace sampled soil and plant material from around the JCO uranium fuel conversion facility. Samples were taken during Sunday 3rd and Monday 4th October, and sent for analysis at the Department of

Radio-Chemistry, at the University of Rikkyo, in Tokyo. Levels of Iodine-131 and Iodine-133 were detected, and calculating back to the period at the end of the accident, around 04.30am on Friday, the
levels were 1182 Bequerels per kilogram for the short lived Iodine-133. These levels were found in the immediate vicinity of the plant: This is not to be determined given the short half lives of 1 day for I-133). Iodine isotopes such as these have very short half lives (I-131 has a half life of 8 days, I-133 has a half life of 21 hours of several hours and therefore will soon decay), due to their activity, they also are probably hiding or masking other radioactive isotopes such as Cesium-137, which is a major isotope in terms of
public health. The levels measured have led Greenpeace to the following conclusions:

- there was radioactive fallout - including Iodine-131 and 133;
- no heavy elements have been released by the accident, these are still in the tank.
- these are volatile substances that would have been released from the uranium facility in the form of a
  fine gas or aerosol. Upon entering the environment, especially since for a period of the accident it was
  raining, the material landed on the ground in the immediate vicinity of the plant, definitely within
  hundreds of metres, but probably also within a few kilo-metres. Wider dispersion is possible, but
  Greenpeace has no measurements of this;
- Undoubtedly released were so-called noble gases, Xenon and Krypton. These would have dispersed into the atmosphere relatively quickly in an easterly and southerly direction. These are beta emitters and would eventually be distributed throughout the northern hemisphere - approximately 12 months. Given the amount of nuclear material involved, 16kg uranium, it is unlikely that the amounts released were large, though only when more details are released on the actual activity, and grams and kilograms fissioned will calculations be possible. No measurements were conducted by Greenpeace for these isotopes - though Greenpeace has conducted large scale Krypton-85 monitoring around the la Hague reprocessing plant in Normandy, France. There levels of Krypton - because all of it is released into the atmosphere, have been measured up to 400,000 Bequerels per cubic meter. Background is around 1.2 Bq/m cubed. This is all due to reprocessing of nuclear waste spent fuel including hundreds of tons from Japan - Tokyo Electric, Kansai Electric, Kyushu, etc.

NEUTRON RADIATION

The other major component to Greenpeace's radiation monitoring was to seek to identify levels of neutron radiation emitted during the accident. Such radiation, which is deeply penetrating, travels in a

straight-line from source for hundreds of meters, passing through almost everything, but losing energy the longer it travels, and the more objects it passes through. Greenpeace's method for measuring neutron radiation was to seek to identify isotopes that had been activated (changed into radioactive substance) by neutron radiation. Specifically in the first few days after the accident it is possible to measure for the radioactive isotope Sodium 24, this is created when the isotope Sodium-23 is activated by neutrons. Greenpeace obtained samples of domestic table salt from two houses around the JCO uranium facility. This cooking salt received the full neutron release during the accident. Only one sample was large enough, 2kg to measure in the laboratory in Rikkyo University. The levels measured on Monday night, 4th-5th October, were then used to calculate levels of neutron radiation at the end of the nuclear accident, Friday 4.30AM, based upon the half-life decay (the period in which a particular radioactive element will lose half its mass) period of sodium24, which is 15 hours. The calculations made gave a figure of 6280Bq/kg, with an error margin of plus/minus 319Bq.

Using this figure we can calculate the neutron yield or flux energy released during the 20 hours of the criticality. This then has been cross referenced with the actual measurements made by the Japanese authorities around the facility in terms of micro-sieverts per hour.

On the basis that neutron radiation traveled at least 500 meters from the accident site, Greenpeace believes that within at least this area hundreds of people would have been exposed to harmful neutron radiation. This compares with the Japanese governments assurance that 49 people were exposed to radiation. According to Professor Wolfgang Koehning, radiation biologist at University of Muenster in Germany, who analyzed Greenpeace's figures, exposure to people in the neighborhood was about 20 milli-sieverts, this compares with a maximum recommended yearly rate of 1 millisievertf or the general public. Within this range of exposure, many people will have received a dose less than this, perhaps half their annual dose. On the other hand, a number of people may have received a dose of many times their annual dose, tens and tens of years even. Actual neutron dose could be even considerably higher according to Professor Koehning.

Neutron radiation is considered harmful to the building block of life human DNA cells, damage to which can seriously increase the risk of cancer and other health effects. Thus the people living in the immediate vicinity of the accident, as well as workers in the fields, and people passing through the area, for the many hours before evacuation were all exposed to neutron radiation. In addition the evacuation procedure was a disorganized mess, with people still in the 350 zone some seven or more hours after the initial criticality. In fact the zone was never completely evacuated, so people were exposed to the full 20 hours of neutron radiation. In addition the zone was not large enough, with people receiving a radiation dose at 400, 500 metres and more. The effects of

the neutron radiation will have to be monitored for the entire exposed population for at least the next thirty years. Blood cancers, leukemia, will only show up in the first ten years, longer-termed induced cancers will take longer to show. This will require a full-scale public health monitoring regime set up by the Health Ministry and the Regional Government. Japan has the most experience in the world in doing this having monitored for more than fifty years the radiation victims of the Nagasaki and Hiroshima atomic bombings.

WHAT YOU CAN DO

If you are a foreign national living in Japan, you have a particular opportunity to help prevent future accidents in Japan. Western nuclear trading states, especially Britain, France, Belgium the Netherlands, Australia, Canada and the United States, all assist Japan's nuclear development. In particular, Greenpeace is battling to stop the UK, France and Belgium from providing any more weapons-usable plutonium to
Japan. Over 30 tons of this dangerous nuclear material is due to be shipped back to Japan over the next ten years. Already Japan has 5 tons of plutonium stockpiled at facilities around the country, most of
which is not by coincidence at Tokai-mura. We recommend that if you feel concerned about this you
express your opinions to your Embassy in Tokyo.

Residents of these countries should ask their governments – government ministers or local members of parliament, for an explanation as to why they support Japan's nuclear program, especially its plutonium program, and urge them to stop before Japan suffers a more serious accident than that which occurred at Tokai-mura on September 30th.