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DETECTING CONTAMINATION-INDUCED TREE STRESS WITHIN THE CHERNOBYL EXCLUSION ZONE

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by Corine Davids, Andrew N. Taylor October 12, 2002 www.elsevier.com/locate/rse

Excerpts from the above cited research:

"The Chernobyl accident in May 1986 released large quantities of radioactive material into the troposphere, resulting in a heterogeneous deposition around the Chernobyl Nuclear Plant as well as across the northern hemisphere. The deposition within the exclusion zone was dominated by fuel particles containing radiologically significant amounts of Strontium 90, Cesium 137, Plutonium 238-241, and Americium 241".....

The effect of the radioactive contamination on vegetation is twofold:

- 1) internal radiation and radiotoxicity as biologically available radionuclides are incorporated in the plant tissue through root uptake.
- 2) External irradiation from radionuclide concentrations in the soil.

..high radiation levels caused extensive mortality of Scots pine.. exacerbated by a massive invasion of pathogenic insects.

"Vegetation stress and vegetation mortality occur when an unfavourable condition or substance affects or blocks a plant's metabolism, growth or development...

The main response mechanisms that plants use are long term metabolic and morphological changes, these include changes in rate of photosynthesis, changes in absolute and relative concentration of photosynthetic pigment [chlorophyll a, b, carotenoids] and changes in leaf size, thickness and structure.

Methods of detecting stress in plants therefore include the rate of photosynthesis [respiration and transpiration] and the measurement of absolute and relative concentrations of pigments in the plant leaves.

"Photosynthetic pigments each have their distinct light absorption characteristics, a change in their relative and absolute concentrations will affect the shape of the overall light reflectance spectrum and can therefore be detected by spectral reflectance analysis and fluorescence imaging."

"Once the relationship between reflectance and pigment concentration has been established through chemical methods, spectral reflectance analysis can provide an inexpensive, fast and non-destructive method for the assessment of the degree of damage in a plant affected by an environmental stress."

These quotations are taken from the above cited Elsevier article "Remote Sensing of Environment" 85 {2003} p. 30-38

"This paper presents the results from laboratory and in situ spectroradiometry of silver birch and Scots pine across a range of contamination levels in the Chernobyl exclusion zone." They succeeded in distinguishing vegetation stressed by soil moisture from stress induced by radionuclide contamination.

IMPACT OF NUCLEAR RADIATION ON PLANTS PHOTOSYNTHESIS AND CHLOROPHYLL CONTENT AFTER BOMBING WITH U 328 ENRICHED BOMBS

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EXCERPTS FROM THE ABOVE CITED RESEARCH:

ABSTRACT

“EFFECT OF NUCLEAR RADIATION DURING ELEVEN YEARS AFTER BOMBING ON SIX PLANT SPECIES PHYSIOLOGICAL ACTIVITIES WAS OBSERVED. IT WAS SHOWN THAT SIGNIFICANT CHANGES IN PHOTOSYNTHETIC ACTIVITIES, PHOTOSYNTHESIS PIGMENTS AND ABILITIES OF THE PLANTS TO CONVERT ABSORBED SOLAR ENERGY INTO PHOTOSYNTHETIC PRODUCT WAS CHANGED. ALSO IT WAS SHOWN THAT CHLOROPHYLL CONTENT WAS SIGNIFICANTLY CHANGED IN SEVERAL PLANTS.”

INTRODUCTION:

“THIS PAPER IS AN EXTENSION OF RESEARCHING THE EFFECT OF INDUCED RADIOACTIVITY ON PHOTOSYNTHESIS IN PLANTS. [JOVANIC ET AL 2003] THE RESEARCH RESULTS SHOW THAT PHOTOSYNTHESIS IN PLANTS IS AFFECTED BY COMPONENTS OF INDUCED RADIOACTIVITY. AFTER THE NATO BOMBING OF SERBIA, AN INCREASE OF SOIL RADIATION HAS BEEN DETECTED”THE REARCH CONDUCTED OVER 11 YEARS SEEKS”TO FIND OUT HOW THIS INCREASED SOIL RADIOACTIVITY CAUSED BY BOMBING WITH U328 ENRICHED URANIUM BOMBS HAS INFLUENCED PHOTO SYNTHESIS” ...OVER 11 YEARS..WE SEEK TO “DETERMINE IF THERE ARE ANY PERMANENT EFFECTS OF INCREASED SOIL RADIOACTIVITY”

MATERIAL: “LEAVES FROM SIX DIFFERENT PLANT SPECIES WERE RESEARCHED..Ribwort Plantain, Stinging nettle, Small leaved Lime, Strawberry, Maple, Common Polybody.. all species grown in Belgrade area before, during and after NATO bombing.

METHODS: ..”CHLOROPHYLL FLUORESCENCE USED ... AS A TOOL FOR MONITORING CHANGES IN PHOTOSYNTHESIS AND SOME PHYSIOLOGICAL PARAMETERS..... EFFECT OF GAMMA RADIATION ON THE SOIL AFTER NATO BOMBING ...RELATIVE CHANGES OF PHOTOSYNTHESIS PIGMENTS [Chlorophyll a and b and carotenides] WERE BASED ON FLUORESCENCE MEASUREMENT”. “WE CONSIDERED RELATIVE CHANGE IN PIGMENT CONTENT AND CAROTENIDES PIGMENTS RESPECTIVELY.”

CONCLUSION: “NUCLEAR RADIATION CAUSED BY BOMBING INDUCED SIGNIFICANT CHANGE IN PLANT PHOTOSYNTHETIC ACTIVITY, ABILITY TO CONVERT LIGHT ABSORBED ENERGY INTO PHOTOSYNTHETIC PRODUCTS AND CHLOROPHYLL CONTENT”.

Please see American- Eurasian Journal of Sustainable Agriculture, 6 [11]: 33-43, 2012 for the complete text. Corresponding Author: Branislav Radomir Jovanic, Institute of Physics, Belgrade University

MONITORING THE DISCHARGE OF RADIOACTIVE SUBSTANCES FROM RESEARCH REACTORS
SAFETY STANDARDS of the Nuclear Safety Standards Commission [KTA] KTA 1507 [06/98]

Editor: KTA- Geschäftsstelle c/o Bundessamt fuer Strahlenschutz [BfS] Willy-Brandt-Str. 38226
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FUNDAMENTALS:

1-3 " SAFETY STANDARD KTA 1507 CONTAINS REQUIREMENTS....FOR MONITORING THE DISCHARGE OF RADIOACTIVE SUBSTANCES WITH AIR AND WATER.. DURING SPECIFIED NORMAL OPERATION AND ..IN DESIGN BASIS ACCIDENTS" ["Design basis" means severe malfunction].

5 "MONITORING THE DISCHARGE OF RADIOACTIVE SUBSTANCES SHALL...PERMIT DETAILED ASSESSMENT OF DISCHARGED SUBSTANCES...INITIATE ALARM SIGNALS IF SPECIFIED VALUES ARE EXCEEDED."

DEFINITIONS: 2.2 "DISCHARGE OF RADIOACTIVE SUBSTANCES..IS THE INTENTIONAL RELEASE OF LIQUID, AEROSOLBOUND OR GASEOUS RADIOACTIVE SUBSTANCES FROM THE FACILITY ALONG PRE-DETERMINED WAYS" [Pre-determined ways means discharge routes to air or water]

3 "MONITORING OF RADIOACTIVE SUBSTANCES DISCHARGED WITH VENT AIR DURING SPECIFIED NORMAL OPERATIONS" 3.1[1] The radioactive substances discharged during normal operation shall be differentiated between the following nuclides: a) radioactive noble gases b) radioactive aerosols, c)radioactive gaseous iodine, d) tritium, e) radioactive strontium, f) alpha emitters, g) carbon 14

3.2.1 "CONTINUOUS MEASUREMENT[1] The discharge rate of radioactive noble gases discharged with exhaust air shall be continuously determined by beta-measurement.....and recording the volumetric flow of the exhaust air".

3.2.2 [2] shows "Table 3-1 which lists nuclides to be considered in assessment of radioactive noble gases discharged with exhaust air: Argon 41, Krypton 85,85m,87, 88, xenon 131m,133,133m,135, 135m,138."

3.3.2 shows Table 3-2 "Nuclides to be considered in detailed assessment of radioactive aerosols discharged with exhaust air: Chromium 51, Manganese 54, Cobalt 58, Iron 59, Cobalt 60, Zinc 65, Zirconium 95, Niobium 95, Ruthenium 106, 103, Silver 110m, Antimony 124, 125, Iodine 131, Cesium 134, 137, Barium 140, Lanthanum 140, Cerium 141,144."

SUMMARY PAGES 1-4 KTA 1507: The above quotations from KTA 1507 demonstrate that all reactors must monitor discharge of all their operating gases to the natural environment. They monitor volumes and content of discharges but will not disclose that information to the public. Most important they do not acknowledge the fact that not one of the radioactive substances produced by fission ever existed before. Each reactor is creating radioactive nuclides that do not exist in nature. Thus 400 reactors globally, each day, are creating toxins that last for thousands of years. Those toxins kill chlorophyll which stops photosynthesis in the biosphere and in the oceans. This is not a reversible process.

REACTOR DISCHARGE KILLS CHLOROPHYLL, STOPS PHOTOSYNTHESIS, REDUCES LEAF SIZE

Each day globally, 400 nuclear reactors discharge their operating gasses to the air and water of the earth.

Each day, each 1000 megawatt reactor, like Seabrook Reactor, takes in 1.5 million gallons of ocean water to cool the reactor core, then discharges that water back into the source many degrees warmer.

Each day the radioactive operating gasses discharged into the atmosphere form hot airborne plumes that travel on prevailing winds, dropping as they cool, to form radioactive contamination on land, sea, marshes, animals, trees and children. The NRC calls these discharges "permissible" because they have no other way of disposing of these gasses. The gasses are not safe to keep on site, the volumes are too great to store.

Each day contamination of plants and trees by radioactive reactor discharge alters plant metabolism by killing chlorophyll, altering photosynthesis, altering leaf biomass, resulting in lesser leaf size and pigmentation, stressing the tree permanently. The syndrome witnessed and researched at Chernobyl was a reddening of Scots pine resulting in elimination of the species in the exclusion zone and pathogenic infestation by insects. Similarly, the pine forests at Fukushima, once verdant, are now red and dying.

Each day radioactive operating fluids are discharged into the ocean from the Seabrook Reactor to join the ocean currents which form gyres spinning the contamination onto all the beaches south of the reactor. We recently witnessed an accidental discharge of millions of filters from a Hooksett NH sewage plant. Those filters arrived in a matter of days on all beaches of the North Shore, Cape Ann, Beverly and Salem.

Each year, each reactor discharges 20,000 to 40,000 curies of radioactive gasses globally into the air and waters of the globe. These gasses join each other in the troposphere to circle the globe to combine with other contaminants.

Each curie of radioactive gas contains 38 billion emissions per second per 2.2 grams of fuel. Each reactor has 100 tons of fuel [1000 megawatt reactor]. Try to do the math. It is inconceivable to imagine 38 billion discharges of anything in one second. An emission is described as a beta decay, alpha decay, or a gamma decay or the number of counts per second a Geiger counter makes in the presence of a radioactive. Basically the unstable, fissioned atom, the by-product of fission, is trying to regain its former stable state. In some cases this may require thousands of years.

Verification of the above assertions can be obtained by Internet search of cited topics.

LETTER TO SENATORS RE PERMANENT POLLUTION FROM REACTOR DISCHARGE

DEAR SENATOR

ENCLOSED PLEASE FIND 4 SYNOPSES OF RESEARCH DOCUMENTS THAT IDENTIFY THE DANGERS OF DAILY DISCHARGE OF REACTOR OPERATING GASSES TO THE NATURAL ENVIRONMENT.

I HAVE PREPARED THESE SUMMARY STATEMENTS BASED ON MY 35 YEAR RESEARCH INTO NUCLEAR FACTS THAT ARE NOT AVAILABLE FROM THE NUCLEAR INDUSTRY OR THE OPERATING REACTORS.

THE PUBLIC DOES NOT HAVE ACCESS TO INFORMATION THAT AFFECTS THEIR DAILY LIVES AND PROPERTY, NAMELY THAT REACTORS DISCHARGE ALL THEIR OPERATING GASSES TO THE AIR AND WATER. THESE GASSES AND FLUIDS TRAVEL IN PLUMES AIRBORNE AND SEABORNE TO BE DEPOSITED ACCORDING TO TEMPERATURE INTERFACES ON LAND OR SEA.

THESE PLUME DEPOSITIONS ARE PREDICTABLE BY COMPUTER MODELS BUT THAT INFORMATION IS NOT DISCLOSED TO THE PERSONS WHOSE LIVES ARE AFFECTED. I SUBMIT THAT THERE IS NO LAW THAT REQUIRES U.S. CITIZENS OR ANY OTHERS TO SUBMIT TO PERMANENT POLLUTION OF THEIR PROPERTIES OR PERSONS.

THE FACT THAT THE NUCLEAR INDUSTRY HAS SUCCESSFULLY MISREPRESENTED THEIR DANGEROUS ACTIVITY FOR DECADES LEADS ME TO ASK YOU TO CONSIDER WHAT ACTION CONGRESS MIGHT TAKE TO REMEDY THIS VERY SERIOUS SITUATION. REPEAL OF THE ACT THAT PROTECTS REACTORS FROM LIABILITY FOR DAMAGES IS ONE POSSIBILITY, ANOTHER IS TO REPEAL THE ENTIRE ATOMIC ENERGY ACT IN WHICH THE NRC HAS A MANDATE TO ADVANCE NUCLEAR POWER.

ALL NUCLEAR IS INHERENTLY DANGEROUS AS IT PRODUCES BY FISSION, RADIOACTIVE ISOTOPES THAT DO NOT EXIST BY NATURAL CAUSE AND DISCHARGES THEM TO THE NATURAL WORLD.

Patricia Pierce

PATRICIA PIERCE, CONSERVATION ADVOCATE, SITE ANALYST

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*Copy to NRC CHAIRMAN
July 8, 2013*

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DEAR BOARD MEMBERS

I AM ENCLOSING RESEARCH DOCUMENTS WHICH DEMONSTRATE THAT NUCLEAR DEBRIS OF ANY SORT, WHETHER FALLOUT FROM EXPLOSIVE DEVICES OR OPERATING DISCHARGE FROM REACTORS, DESTROYS CHLOROPHYLL, EFFECTIVELY ENDING PHOTOSYNTHESIS.

THIS EXPLAINS THE "RED FOREST" SYNDROME NOW EVIDENT AT THE FUKUSHIMA CATASTROPHE, CHERNOBYL, AND LARGE FOREST AREAS IN THE WEST. [PLEASE SEE THE ENCLOSED RESEARCH FROM STIRLING UNIVERSITY, SCOTLAND].

THE NUCLEAR INDUSTRY HAS REPEATEDLY CLAIMED THAT THEIR TECHNOLOGY IS CLEAN, SAFE. IT IS NOT. GLOBAL WARMING IS NOT JUST A FUNCTION OF CARBON EXCESS. IT IS AN ACUMULATION OF TOXIC EVENTS OF LETHAL MAGNITUDE FOR ALL LIFE FORMS.

IT IS WAY PAST TIME TO REVEAL THE TRUTH ABOUT ALL NUCLEAR DISCHARGE. EVEN AFTER TWO YEARS OF RADIATION RELEASE FROM FUKUSHIMA, THERE IS NO EFFORT TO WARN THE PUBLIC, TO PROTECT THE PUBLIC OR THE ENVIRONMENT.

I AM NOW WITNESS TO MYRIAD DEAD TREES HERE IN ROCKPORT, TREES WITH STUMPED LIMBS, SEEDING IN EARLY SPRING, DYING THE NEXT YEAR. WE ARE IN THE SEABROOK PLUME PATH FOR 20 YEARS. OUR TREES ARE NOT LEAFING FULLY. HURRICANES ARE BRINGING RADIATION DEBRIS UP THE COAST LEAVING BROWN SHRIVELLED FOLIAGE. IT MAY BE TOO LATE.

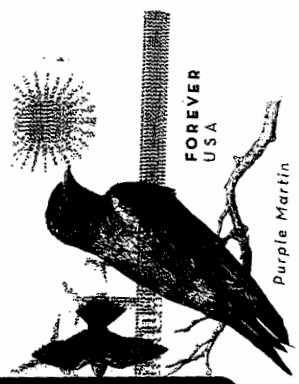
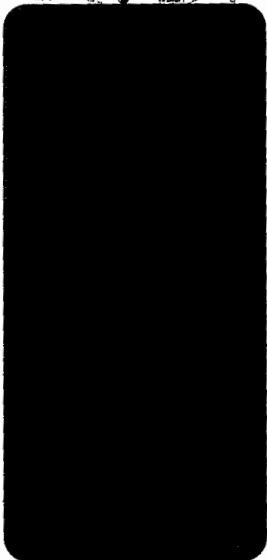
I DON'T KNOW WHAT TO RECOMMEND AS A REMEDY BUT THE EFFORT MUST BE SUCCESSFUL. YOU ARE COLLECTIVELY RESOURCEFUL AND INFLUENTIAL. THE NRC IS MANDATED TO ENCOURAGE AND FACILITATE NUCLEAR ENERGY. IT IS MY OBSERVATION THAT RADIATION DEBRIS FIELDS ARE ATTRACTED TO OTHER MAGNETIC FIELDS, WITNESS THE DISCOVERY OF THE VAN ALLEN BELTS DURING ATOMIC TESTING IN THE PACIFIC.

Patricia Pierce
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APRIL 19, 2013

*copy to NRC Chairman
July 8 2013*

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