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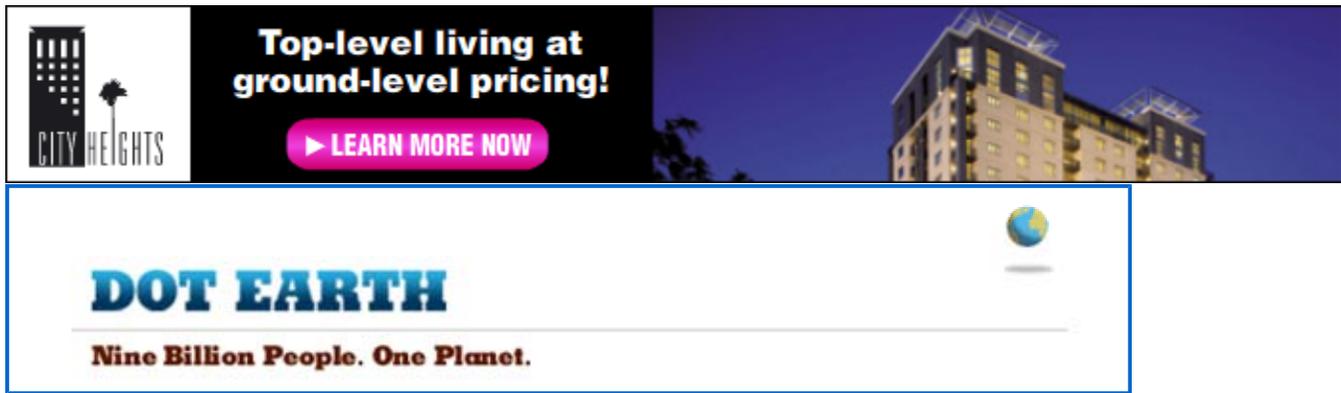
The New York Times

Thursday, August 12, 2010

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DOT EARTH
Nine Billion People. One Planet.

August 11, 2010, 11:27 am

Chernobyl, Fires and Radiation

By [ANDREW C. REVKIN](#)

8:25 p.m. | Updated

There are some [heated headlines out there](#) as fires spring up in the zone contaminated by the [Chernobyl nuclear reactor disaster](#). The reality, according to specialists in environmental risk from fires and radiation, is that any radiation contained in the resulting smoke and other emissions is very unlikely to pose a significant health risk [*with one exception possibly being in firefighters working in the area; see below].

This very question came up two years ago when [Chadwick Oliver of Yale University and other forest experts](#) warned that the risk of uncontrollable wildfires in the region was growing. In May 2000, hundreds of firefighters fought a big peat fire in the region. Belarus officials concluded [there was no rise in radiation levels](#). In an e-mail exchange at the time, Robert Barish, [a health physicist and radiation consultant](#), sent the following input on radiation risk from forest fires:

With respect to your question, in the case of forest fires, there is remobilization of radioactive materials that have been deposited into the plant material. The risks however, depend strongly on two factors:

First is how much of the deposited material has actually been taken up by the trees/plants themselves. Some studies have shown that there is a competing pathway for other minerals like potassium that lower the concentration of cesium and strontium in the plant material to levels that are significantly lower than they might be otherwise. Also some of the material is leached back into the soil.

The second is the dispersal pattern. It is the latter that leads to a very significant dilution of any radioactivity as it is spread through huge volumes of air, thus significantly reducing its concentration.

A paper from the Ukrainian Institute of Agricultural Radiology showed an estimated inhalation dose of 1/10,000 to 1/100,000 of background levels to firefighters confronting a wildfire near the Chernobyl site:

[Forest fires in the territory contaminated as a result of the Chernobyl accident: radioactive aerosol resuspension and exposure of fire-fighters](#)

V. A. Kashparov, S. M. Lundina, A. M. Kadygriba, V. P. Protsaka, S. E. Levtchuka, V. I. Yoschenkoa, V. A. Kashpurb and N. M. Talerko

Journal of Environmental Radioactivity Volume 51, Issue 3, December 2000, Pages 281-298

I've sent a fresh query to a group of forest, fire and health researchers to get more input on this question.

[* Barish sent a followup e-mail message tonight adding a cautionary note about possible health issues for firefighters facing fires in the contaminated zone:

Vasily Yoschenko in Kiev is an excellent resource for information about the present situation.... Yoschenko and Kashparov are the two "local" experts on this....

From my own, less than expert perspective, there is no question that forest fires will cause remobilization of the radioactive materials, as I stated in 2008. Also, the dispersal pattern is still the major influence on the airborne concentration of these radioactive materials.

Yoschenko published more detailed data in 2005 and 2006 than I cited in the Kashparov reference from five years earlier. Obviously my quote from the 2000 paper is valid, but more up-to-date information can come from the two Russians. In a 2006 paper, Yoschenko stated that: The radionuclide fallout along the plume axis is negligible in comparison to the existing contamination. However, the additional inhalation dose for firemen exposed in the affected area can reach the level of the additional external irradiation in the period of their mission.

What this means is that the airborne radioactivity can essentially double the dose to the fire personnel from inhalation of the radioactive materials. i.e., they are being irradiated both from outside and inside whereas the "normal" radiation exposure is only external when you are in the Chernobyl zone. The airborne contamination doesn't much change the existing amount on the ground (it goes up and then comes back down) but, as previously noted, it might disperse over greater distances, albeit at lower concentrations because of dilution.]

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1.

Peter Maier

Utah

August 11th, 2010

9:00 am

Due to the huge increased used of synthesized fertilizer, reactive nitrogen (among them nitric oxides) have significantly increased in the atmosphere. All these forms of nitrogen are fertilizer and when it rains they come down. This 'green rain' stimulated grasses and undergrowth that between a dry period hits, dry out quickly and catch fire easily and such range fires are hard to control. Also due to the large amount of fuel, now also large trees catch fires and when dead do not maintain a root system to hold the soil, hence soil erosion and mud slides.

In stead of ecosystems, we should call them domino systems, because if one stone falls it tumbles the stones next to it and the impact of the huge increase of synthesized fertilizer start affecting the entire biosphere, while still mostly ignored.

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2.

HIGHLIGHT [\(what's this?\)](#)

James Aach

United States

August 11th, 2010

9:13 am

Once the headlines indicate there is uncontrolled man-made radioactivity on the loose -- in any amount - - the discussion is over for a fair chunk of the public. A sizeable segment of the population view such radiation as having the same effects as nerve gas, where one whiff equals doom. I'm glad you're looking to the scientifically-based health physics community for answers. Of course, even if there's no negative radiation-induced health effects from this event, that doesn't excuse Chernobyl. There was no excuse for that.

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[3.](#)

[Earl E](#)

The Lost World

August 11th, 2010

9:14 am

I thought cancers started from just one incident of a cell being hit with one high energy particle. The cell mutates and divides.. and there you go.

I take from this story that no high energy particles become airborne from burning ground contaminated with radioactive fallout based on the study.

In this study, I'll bet thousands of samples were taken from within the fire plume because that's what scientists do, they stand inside highly radioactive quarantined forests engulfed in fire and collect samples methodically.

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[4.](#)

Paul V.

Washington DC

August 11th, 2010

12:43 pm

Thanks for that needed corrective, Andy. That Times article was one of the more disappointing pieces I've seen the paper run in some time. It does point to the much lower standards we have for foreign correspondence, which was true even when there were fully staff bureaus. I can't imagine a parallel story based in the U.S. passing through the newsroom into print.

I'll be interested to see what your sources add to the conversation.

[Recommend](#) Recommended by 0 Readers

[5.](#)

coddington.morton

New Hampshire

August 11th, 2010

12:43 pm

Boo hoo.

Back when the Soviet Socialists had their blow up of their primitive and dangerous reactor, of a design never used in the West, the environmentalists were all drunk with prophecies of doom.

In the end, there were a lamentable 31 deaths in the immediate aftermath and 216 between 1991 and 1998 that have been attributed to radiation poisoning.

The professional hypocondriacs and others in the scaredy-scary industry have tried, rather predictably, to pin anything they can find on the irresponsible Socialists's disaster, from down syndrome in Germany to spina Bifida in an area of Eastern Turkey (never mind there are four entire rather large countries

between Chernobyl and Turkey).

The United Nations's UNSCEAR declared in July 2007:

«There is no evidence of a major public health impact attributable to radiation exposure 20 years after the accident. There is no scientific evidence of increases in overall cancer incidence or mortality rates or in rates of non-malignant disorders that could be related to radiation exposure. The risk of leukaemia in the general population, one of the main concerns owing to its short latency time, does not appear to be elevated»

So if the professional overannuated and tax-exempt worrywarts at the UN are so over the world-ending catastrophe that never was, why shouldn't we?

Reminds one of the Gulf on how people were saying it was "dead forever" just a few weeks ago. Pathetic, really.

[Recommend](#) Recommended by 8 Readers

[6.](#)

Jeremy Abramowitz

Washington, DC

August 11th, 2010

12:43 pm

The more legitimate concern pertains to the risk to other nuclear facilities and the possibility of new accidents. With droughts, wildfires, and other extreme climate events on the rise, will nuclear energy really provide an answer to climate change woes? Or is the pale green crowd brushing aside legitimate concerns of catastrophic and deadly failures in critical infrastructure by calling nuclear power the 'lesser of two evils?' Just one of several reasons that many proponents may be missing the forest for the trees...

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[7.](#)

James

Northern Nevada

August 11th, 2010

12:44 pm

Err... Despite the hysteria, this radioactive material didn't prove to be a serious health threat at the time of the Chernobyl accident. Why should it be so now?

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[8.](#)

Daniel

San Jose, CA

August 11th, 2010

12:44 pm

#3 - Earl E

I think you just illustrated James Aach's point in #2 perfectly. Yes - in theory, it only takes one high energy particle hitting just the right spot in a cell's chromosome to cause cancer. However, you get hit by thousands of naturally occurring high energy particles every minute. Most don't hit your DNA at all. Of those that do, your body's immune system eliminates most of the damaged cells.

In order to raise your risk of cancer, you need to get hit with a lot of radiation. The scientists are saying that there just isn't enough exposure from this wildfire smoke to increase your risk beyond what you get from naturally occurring radiation.

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[9.](#)

Michael May

Chicago
August 11th, 2010
12:44 pm
Earl E,

I thought cells mutated all the time but that the body has natural defenses and usually triggers these cells to self-destruct. But your one trigger theory is terrifying. Nobody should ever go outside if you're correct.

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[10.](#)

[jgkoomey](#)

Oakland, CA
August 11th, 2010
12:44 pm

Earl E. #3: Yes, cancers can be induced by a cell being hit with one high energy particle, but whether it turns into full blown cancer depends on how the body responds. There's a process called the cell death mechanism that often kills off cancer cells before they really take hold--it's when that mechanism doesn't work that you end up with cancer.

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[11.](#)

HIGHLIGHT ([what's this?](#))

Richard Reiss
New York
August 11th, 2010
12:44 pm

Burning radioactive forests -- this manages to compress the entire human story of 'the energy quest' into a single phrase.

[Recommend](#) Recommended by 2 Readers

[12.](#)

melty
West Orange, NJ
August 11th, 2010
12:44 pm

What is the safe dose of polonium?

[Recommend](#) Recommended by 0 Readers

[13.](#)

Mike O'Brien
Portland Oregon
August 11th, 2010
12:44 pm

et tu, Prometheus?

[Recommend](#) Recommended by 0 Readers

[14.](#)

Asteroid Miner
Illinois
August 11th, 2010
12:44 pm

EVACUATE DENVER!!!!

If you live in Chernobyl the total radiation dose you get each year is 390 millirem. That's natural plus residual from the accident and fire. In Denver, Colorado, the natural dose is over 1000 millirem/year. Denver gets more than 2.56 times as much radiation as Chernobyl! But Denver has a low cancer rate.

Calculate your annual radiation dose:

<http://www.ans.org/pi/resources/dosechart/>

Average American gets 361 millirems/year. Smokers add 280 millirems/year from lead210. Radon accounts for 200 mrem/year.

<http://www.doh.wa.gov...>

<http://www.nrc.gov...>

Although radiation may cause cancers at high doses and high dose rates, currently there are no data to unequivocally establish the occurrence of cancer following exposure to low doses and dose rates -- below about 10,000 mrem (100 mSv). Those people living in areas having high levels of background radiation -- above 1,000 mrem (10 mSv) per year-- such as Denver, Colorado have shown no adverse biological effects.

<http://www.nrc.gov...>

Calculations based on data from NCRP reports show that the average level of natural background radiation (NBR) in Rocky Mountain states is 3.2 times that in Gulf Coast states. However, data from the American Cancer Society show that age-adjusted overall cancer death in Gulf Coast states is actually 1.26 times higher than in Rocky Mountain states. The difference from proportionality is a factor of 4.0. This is a clear negative correlation of NBR with overall cancer death. It is also shown that, comparing 3 Rocky Mountain states and 3 Gulf Coast states, there is a strong negative correlation of estimated lung cancer mortality with natural radon levels (factors of 5.7 to 7.5).

<http://www.ncbi.nlm.nih.gov/pubmed/9753369>

If you are worried about cancer, worry about BENZENE. Radiation is used to CURE cancer. Benzene comes from petroleum and coal. If you have cancer, there is a good chance there is benzene in your past.

[Recommend](#) Recommended by 5 Readers

[15.](#)

Jean M

Livermore, CA

August 11th, 2010

5:07 pm

Thanks for the rational numbers, to those who are posting them. For those who've latched onto the politics of "there's no safe level," you're the problem. And not with nuclear energy issues, only.

You're the ones who don't think about numbers, who don't appreciate subtleties, who paint the world in black and white, and act accordingly, often with dumb remarks like, "I thought cancers started from just one incident of a cell being hit with one high energy particle."

Liberals and conservatives alike (I've heard such remarks from both sides), you're the ones who cloud the debate and prevent solutions.

So, for you, the ones who are the problem, next time you get the urge to waste the time of everyone who might read this message board, maybe spend some of your own time and learn something first.

Oh, yeah, experts don't know what they're talking about, right? Maybe next time you fly somewhere you can ask your fellow passengers how they feel about you (assuming you're not a pilot) flying the plane.

[Recommend](#) Recommended by 4 Readers

[16.](#)

Asteroid Miner

Illinois

August 11th, 2010

5:08 pm

According to the book: "Power to Save the World; The Truth About Nuclear Energy" by Gwyneth Cravens, 2007 [Finally a truthful book about nuclear power.]:

Page 70: Natural background radiation where the author happens to be at the time is higher than what people living at Chernobyl are getting. The US national average background radiation is 360 millirems/year.

Page 71: The natural background radiation in northeastern

Washington state is 1700 millirem/year.

The natural background radiation on the Zuni uplift is 500 to 700 millirem/year.

The natural background radiation in New Mexico is greater than the calculated dose from the Three Mile Island meltdown, if you were next to the reactor.

A chest x-ray gives you 10 millirem.

Page 72: The natural background radiation inside Grand Central Station is 600 millirem/year because Grand Central Station is made of granite. [ALL rocks are radioactive.]

The allowed exposure to the public from a nuclear power plant is 15 millirem/year.

A set of dental X-rays gives you 39 millirem.

Page 74: Smoking a pack and a half of cigarettes a day gives your bronchial airways 1300 millirems/year according to the NCRP OR 8000 millirems/year according to the National Academy of Sciences.

Page 75: A coal fired power plant gives you 100 to 400 times as much radiation as a nuclear power plant. Worldwide, an average person gets 0.01 millirem/year from nuclear power plants, the same as eating one banana. Bananas contain potassium and some of the potassium is radioactive potassium 40. This has always been the case.

Page 76: The cancer rate in New Mexico is much lower than the national average but the natural background radiation is much higher than average. The highest rates of cancer are around heavy industry, chemical factories and petrochemical factories. [Benzene, a petroleum distillate, is a very powerful carcinogen.]

Page 77: Natural gas contains radon, a radioactive gas.

Page 86: Among 80000 nuclear bomb survivors from Hiroshima and Nagasaki, the cancer rate was only 6% higher than expected. Radiation is very weak at causing cancer.

Page 90: At Chernobyl, only 13 to 30% of the reactor's 190 metric tons of fuel evaporated.

.13X190=24.7 tons.

.3X190=57 tons. [Much lower than the previous estimate of 200 tons, and trivial to what coal fired power plants give you.]

Page 98: There is a table of millirems per year from the background in a list of inhabited places.

Chernobyl: 490 millirem/year

Guarapari, Brazil: 3700 millirem/year

Tamil Nadu, India: 5300 millirem/year
Ramsar, Iran: 8900 to 13200 millirem/year
Zero excess cancer deaths are recorded. All are natural except for Chernobyl.

Page 99: There was an epidemic of PSYCHOSOMATIC illnesses caused by the Chernobyl accident.

Page 100: Only 50 deaths can be directly attributed to radiation at Chernobyl.

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[17.](#)

Asteroid Miner

Illinois

August 11th, 2010

5:09 pm

Why a Nuclear Powerplant CAN NOT Explode like a Nuclear Bomb:

Bombs are completely different from reactors. There is nothing similar about them except that they both need fissile materials. But they need DIFFERENT fissile materials and they use them very differently. A nuclear bomb "compresses" pure or nearly pure fissile material into a small space. The fissile material is either the uranium isotope 235 or plutonium. They are the reduced bright shiny metals, not metal oxide. If it is uranium, it is at least 90% uranium 235 and 10% or less uranium 238. These fissile materials are metals and very difficult to compress. Because they are difficult to compress, a high explosive [high speed explosive] is required to compress them. Pieces of the fissile material have to slam into each other hard for the nuclear reactions to take place.

A nuclear reactor, such as the ones used for power generation, does not have any pure fissile material. The fuel may be 0.7% to 8% uranium oxide 235 mixed with uranium 238 oxide [uranium rust]. A mixture of 0.7% to 8% uranium 235 rust mixed with uranium 238 rust cannot be made to explode no matter how hard you try. A small amount of plutonium oxide mixed in with the uranium oxide can not change this. Reactor fuel still cannot be made to explode like a nuclear bomb no matter how hard you try. There has never been a nuclear explosion in a reactor and there never will be. [Pure reduced metallic uranium and plutonium are flammable, but a fire isn't an explosion.] The fuel is further diluted by being divided and sealed into many small steel capsules. The capsules are usually contained in steel tubes. The fuel is further diluted by the need for coolant to flow around the capsules and through the core so that heat can be transported to a place where heat energy can be converted to electrical energy. A reactor does not contain any high speed [or any other speed] chemical explosive as a bomb must have. A reactor does not have any explosive materials at all.

As is obvious from the above descriptions, there is no possible way that a reactor could ever explode like a nuclear bomb. Reactors and bombs are very different. Reactors and bombs are really not even related to each other.

Recommendation: Nuclear power is the safest kind and it just got safer. Convert all coal-fired power plants to nuclear ASAP. See the December 2005 issue of Scientific American article on a new type of nuclear reactor that consumes the nuclear "waste" as fuel.

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[18.](#)

[Russ Finley](#)

Seattle

August 11th, 2010

5:17 pm

Hats off to the quality of your commenters, Andrew.

Read "Wormwood Forest" for an honest perspective on Chernobyl.

[Recommend](#) Recommended by 0 Readers

19.

Earl E

The Lost World

August 11th, 2010

5:19 pm

Thanks for the information on cell destruction in the body, I was unaware of many of the points made.

Is there any difference between being hit with radiation and inhaling a radiation producing particle? If I inhale ash from Chernoble, does it contain elements that will produce radiation as long as it sits in my lung?

That would seem different from walking by a radon source in my basement.

Recommend Recommended by 0 Readers

20.

Helga

Olinda, Brazil

August 11th, 2010

5:37 pm

I was going to suggest for everybody to have a look at this site:

www.elenafilatova.com which is outstanding, informative, highly intelligent and informed. It tells you all about Chernobyl then and now, especially how it really was and is, but I see that just now somebody suggested 'Wormwood Forest' which is also valid.

Recommend Recommended by 0 Readers

21.

G. Howard

Idaho

August 11th, 2010

7:07 pm

This morning I had my laptop facing such that I wouldn't get too much glare from the sun reading the news. However I was careful to be positioned so I could still get some good rays.

I came across this story and wondered why anyone would willingly subject themselves to radiation. We must all be careful or we might become mortal and enjoy life a little bit.

There are two important things to do. One is worry about what others are doing to destroy you and everyone else. Two is to worry what you are doing to destroy yourself.

The most important of course is what others do as you have less control over them. The main thing though is stay worried that the end is near and some day you will be right. We must all live by the cautionary principle so please wear a helmet when you take a shower. The fall you may take in the shower may well be a bigger danger to you than global warming at this point.

Recommend Recommended by 2 Readers

22.

James

Northern Nevada

August 12th, 2010

5:20 am

Re #9: "Nobody should ever go outside if you're correct."

I don't know of any actual measurements, but I think that if your goal is to minimize exposure to radiation, you'd be quite a bit better off never going inside. Unless your roof and walls are made of quite thick lead sheets, those cosmic rays are going to zip right through. Then there are things like granite countertops, smoke detectors, radon accumulations, and more.

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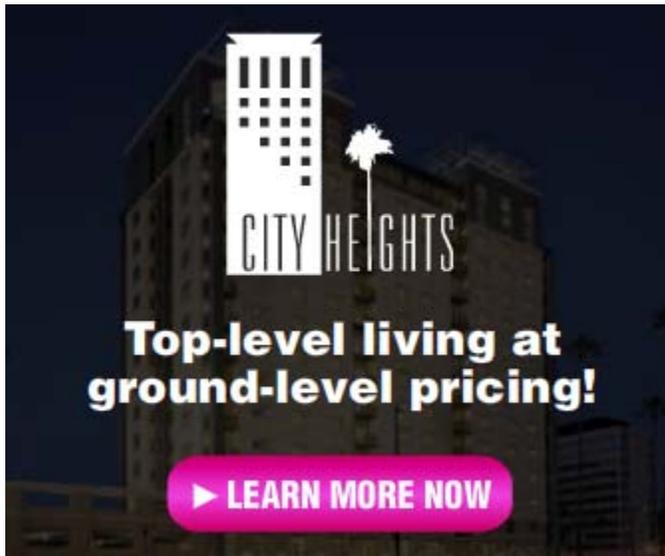
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