

JAPAN NUCLEAR ACCIDENT INFO NAVIGATION GUIDE

**Credible sources of info on what's
happening, and understanding it.**

Identifying “The Horse’s Mouth” for people who have been overly dependent on the other end of the horse (the news media) and are starving for better information.

Alister William Macintyre research notes

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INTRODUCTION (1 MAR 25)

As I learn more about what’s going on in Japan, I increasingly see questions from people, in various professional and social networking sites, who have been duped by the news media wild speculations and poor reporting. They obviously need help getting at the truth. Of course some people can be so vulnerable to conspiracy theory beliefs, that I cannot help them. The issue is who we want to believe more: news media; government; industry; United Nations; academia. Can we get at truth by comparing what the different info sources have to say? I believe we can get best truth available, by going to primary sources, the people who are doing things, then sharing statements about what they are doing. Yes, the statements can be self-serving: something went wrong, it wasn’t our fault, we doing the best we can. But such information can be vastly superior to those by people who do not understand the situation, are interpreting statements from many sources, don’t know which are relevant experts and which are propagandists promoting an agenda, or sales pitch.

Research notes document structure (1 Feb 16)

Topic sub-titles end in a date signifying when that info last updated, so by viewing table of contents, we see where most recent input to these research notes, especially aiding people with copy of an earlier version. Digit 1 in front of month means 2011.

Version numbers are incremented, with this document periodically uploaded various places for convenience of other people who can then pick and choose which of my research efforts they wish to download.

Users of my research hold Alister Wm. Macintyre harmless, and also the places I upload my research to, and agree that my copyright is reserved and that the information is available for the intended purpose of helping in the recovery of Haiti and Japan. Some of my research content is direct quotes from other sources. I try to give credit every time I do this.

Japan notes documents (1 May 04)

Over time, I have split my Japan and related notes, and now have them in the following documents:

- Acronyms Glossary for Haiti – many of the acronyms are relevant to many disasters.
- EOJ = initial naming convention for some of my Earthquake Japan documents, to distinguish them from Haiti notes. In time, I removed EQJ prefix, and spelled out main words of content, except for some downloads from official sources.
- EOJ Japan Overview = non-nuclear focus ... earthquake and tsunami recovery.¹
- EOJ Nuclear News = make sense of what's going on with the nuclear power plants – many topics which I am splitting into more focused notes areas
- EOJ Nuclear Time Line = visualize progression of events and trends, to help make sense without the distortion of the many actors with an agenda
- EOJ SitReps = Japan Situation Reports²
- Japan Nuclear Accidents Glossary of Terminology and Acronyms = Try to explain specialized geek language associated with the Japan nuclear disaster, and related recovery. A person working with any of my EOJ documents also ought to get a copy of this.
- Japan Nuclear Info Navigation Guide = Identifying “The Horse’s Mouth” for people who have been overly dependent on the other end of the horse (the news media), and are starving for better information.
- Lessons Japan Disasters for the whole world = what we should have learned from Japan’s disasters, to apply to rest of world to mitigate risk of something similar happening some place else.
- Map Directory = directory of map sources relevant to disasters in Haiti and Japan and other places, also Middle Eastern Democracy Movements.
- I have also downloaded some OFFICIAL documents, named them with a mixture of EOJ, what they are about (e.g. Map), date vintage and organizational source.

For a variety of reasons, I began to fall behind on keeping these notes current, so early in April I shifted focus to getting Time Line current, then revert to more of the big picture. Thus some of my other notes may have gaps in detail.

¹ Info on Mapping sources got moved into Maps Directory document so in one place are where to find Maps about Haiti, Japan, other disasters, and also regarding Democracy seeking a foothold in the Middle East.

² Mainly non-nuclear, what I consider to be the bigger disaster for the people more due to tsunami than earthquake.

Version Sharing (1 Mar 25)

I periodically upload my research notes documents to various public sites where my friends and contacts may freely cherry pick which of my efforts to download copies for themselves. These include:

- Box net on Linked In
- E-mail to some contacts (Macwheel99 is a play on my surname)
- Facebook = I am Alister Wm Macintyre there
- Google = I am Alister Wm Macintyre there³
- [Haiti Rewired](#)⁴ / For other than Haiti, see group = Current Events
- Japanese Resilience (I am user AlMac99)⁵
- Linked In / my profile = [Al Macintyre](#)⁶ / my box net files / folders by general topics⁷
- [Plan Haiti](#) has some of my early Haiti research⁸
- [Prizm](#) – so far mainly Haiti research⁹
- [Rebuild Haiti Better](#) – so far just Haiti research¹⁰
- [Scribd](#) (I am user AlMac99) <http://www.scribd.com/AlMac99>
- [Yahoo HDRR](#) – only Haiti here, and disaster relief in general, where it applies to Haiti¹¹

After sharing, I usually increment version # to make it easy for people to see which latest version in later uploads. But you can also see by verifying table of contents up-to-date, then date in parentheses at ends of headings to see which got most recently updated.

³ <http://www.google.com/profiles/108007903544513887227>

⁴ <http://haitirewired.wired.com/profile/AlisterWmMacintyre>

⁵ <http://japan.resiliencesystem.org/nuclear-engineering-issues>

⁶ <http://www.linkedin.com/in/almacintyre>

⁷ Outside the folders are documents which cross topics, such as Maps Directory of sources relevant to Haiti, Japan, Middle East, and more.

⁸ <http://sites.google.com/site/planhaiti/home>

⁹ <http://www.haiti.prizm.org/>

¹⁰ <http://rebuildhaitibetter.ning.com/profile/AlisterWmMacintyre>

¹¹ <http://groups.yahoo.com/group/HaitiDisasterRecoveryResearch/>

Tags (1 May 04)

When uploading this document to places which make descriptions practical, maybe I should start with the following:

Deciphering reports, on Nuclear Accidents in Japan, can be challenging for the Layman, due to lots of technical terminology, poorly understood by news media, some of which have a scare-mongering agenda, risks of persons who share responsibility for inadequate mitigation of predictable disasters, making self-serving statements. People can be particularly alarmed by reports on radiation, and distracted by seeing comparisons to Chernobyl. Here I try to share credible sources of information, translating geek into understandable for the layman, providing radiation info in perspective, and showing the big picture on nuclear accidents.

I have several sister research notes documents, including a glossary of the terminology, time line of the nuclear accident events, lessons which should be learned, and directory of maps.

JAPAN AND NUCLEAR WIKI AND FAQ (1 MAY 12)

Other places with relevant information, in case you not find what you looking for in what I am sharing below.

Crisis Commons has created a Japan Data Profile wiki containing various data sources relevant to the Japan earthquake and tsunami response, and the nuclear situation:

http://wiki.crisiscommons.org/wiki/Japan_Data_Profile

FAO,¹² IAEA¹³ and WHO¹⁴ (UN agencies) are committed to mobilizing their knowledge and expertise in support of the Japanese government's ongoing efforts to address food safety and other issues stemming from the events of 11 March.¹⁵ They have created a [FAQ](#) to answer common questions about safety in Japan.¹⁶

1. [Current risk](#)
2. [Ionizing radiation](#)
3. [Human exposure to ionizing radiation](#)
4. [Travel advice](#)
5. [Health effects](#)
6. [Public health actions](#)
7. [Personal protective measures](#)
8. [Food safety](#)
9. [WHO's response](#)

¹² FAO = Food and Agriculture Organization

¹³ IAEA = International Atomic Energy Agency

¹⁴ WHO = World Health Organization

¹⁵ http://www.who.int/mediacentre/news/statements/2011/japan_20110323/en/index.html

¹⁶ <http://www.who.int/hac/crises/jpn/faqs/en/index7.html>

[World Nuclear News](#)¹⁷ has created a [Fukushima Portal](#),¹⁸ with links to many different wonderful information sources on the Japan nuclear crisis stemming from the 2011 March 11 Earthquake and Tsunami, such as:

Fukushima, Earthquakes and Safety

- [Fukushima Accident 2011](#)
- [Nuclear Power Plants and Earthquakes](#)
- [Safety of Nuclear Power Reactors](#)
- [Nuclear Radiation and Health Effects](#)
- [Policy Responses to the Fukushima Accident](#)

Statistics

- [World Nuclear Power Reactors](#)
- [Nuclear share figures](#)
- [Uranium production figures](#)
- [WNA Nuclear Database](#)

Previous Nuclear Accidents

- [Chernobyl Accident](#)
- [Three Mile Island Accident](#)
- [Tokaimura Criticality Accident](#)

There are many potential threats to a nuclear power plant, including acts of terrorism, and war. Remember that the Iran nuclear program was set back seriously thanks to what Stuxnet virus did to their nuclear control devices. [Here is a Stuxnet Beginners Guide](#).¹⁹

Below is a link to a free presentation on implementing NERC CIP compliance by Ernest Hayden, compiled when he was Information Security Strategic Advisor at Seattle City Light. There are also two reports by Eric Byres, Tofino Security, on the spread of Stuxnet.

The first presentation gives an outstanding pragmatic how to guide to implementing NERC CIP 003. The two reports give an excellent overview of how Stuxnet spreads and a look at the technology to control the spread. Download the full presentation [here](#).²⁰

¹⁷ <http://www.world-nuclear-news.org/>

¹⁸ http://www.world-nuclear.org/fukushima/japanese_tohoku_earthquake.html

¹⁹ <http://www.i-programmer.info/news/149-security/2201-cracking-stuxnet-a-beginners-guide.html>

²⁰ <http://www.eyeforenergy.com/cyber/download-presentations.shtml>

NUCLEAR FOR LAYMAN (1 MAR 25)

In this section I share links to credible nuclear physics places to make sense of what's happening with the nuclear accidents in Japan, so it is understandable to people who did not study this topic in school, or have forgotten what was taught, or not up-to-date on how that technology has evolved, what the real risks are, how nuclear public policy ought to evolve in our nation. Some of these places also include what's happening.

Of these people who understand the physics, who can explain it to laymen, I suspect some of them have a pro-nuclear agenda. They see the same stuff we see.

- Official announcements
- Explosions
- Radiation readings

But they understand the science right off, can explain it. We laymen go duh, many science and risk questions with each chunk of new info. They too can be left with some uncertainty, because we do not yet have complete facts, may never have whole story.

JAPAN NUCLEAR IS NO BIG DEAL (1 MAR 31)

For a non-hysterical view of the Japanese nuclear events, see:

<http://bravenewclimate.com/2011/03/13/fukushima-simple-explanation/>

Along with reliable sources such as the [IAEA](#) and [WNN](#) updates, there is an incredible amount of misinformation and hyperbole flying around the internet and media right now about the [Fukushima nuclear reactor situation](#).²¹ In the BNC post [Discussion Thread – Japanese nuclear reactors and the 11 March 2011 earthquake](#) (and in the many comments that attend the top post), a lot of technical detail is provided, as well as regular updates. But what about a layman's summary? How do most people get a grasp on what is happening, why, and what the consequences may be?

The post goes on by sharing what I earlier found from Dr Josef Oehmen, which of course is dated, and put in the "Peace of Mind" section below. Stuff has happened since that info.

Content Updated 15 March, see: <http://mitnse.com/>

Interesting quote [from Rod Adams](#):

According to the writer and editor who approved th[is] summary, "An explosion at a nuclear power plant on Japan's devastated coast ... made leaking radiation, or even outright meltdown, the central threat menacing a nation." Apparently aftershocks, fires, broken dams, washed out highways, lack of clean drinking water, damaged sewer systems, destroyed

²¹ There are TWO Fukushima nuclear power plants. I Dai-ichi situation much more serious than II Dai-ni, but a massive volume of sources, which should know better, are blurring which is which.

airports, and at least a thousand known fatalities are not as much of a threat to the nation of Japan as the possibility that a few people might be exposed to a radiation dose that is roughly equivalent to the ones administered every day as part of routine medical procedures.

Also see in my **Japan Nuclear Glossary**, after Terminology section, where I include FAQ for Laymen on various ingredients of the big picture.

PEACE OF MIND (1 MAR 14)

Thanks to Brandon²² for steering me to this.

[Peace of Mind from professionals.](#)²³

The nuclear facility situations in Japan will prove to be a crisis communications disaster and a public relations disaster, much more so than a public health or environmental disaster.

The above link is to a long blog from *Morgsatlarge* with information supplied by *Dr Josef Oehmen, a research scientist at MIT, in Boston.*

He is a PhD Scientist, whose father has extensive experience in Germany's nuclear industry. The blog source asked him to write this information to his family in Australia, who were being made sick with worry by the media reports coming from Japan. Then Morgsatlarge republished it with Dr.O's permission.

I am sharing some bullet points here, advise people to read the whole thing.

Up front, the situation is serious, but under control.

There was, and will *not*, be any significant release of radioactivity.

News Media misinformation (1 Mar 13)

Dr. O has been reading every news release on the incident since the earthquake. There has not been one single (!) report that was accurate and free of errors (and part of that problem is also a weakness in the Japanese crisis communication). He has read a 3 page report on CNN where every single paragraph contained an error.

The plants at Fukushima are so called Boiling Water Reactors, or BWR for short.

The nuclear fuel (uranium oxide) heats water, the water boils and creates steam, the steam then drives turbines that create the electricity, and the steam is then cooled and condensed back to water, and the water send back to be heated by the nuclear fuel. The pressure cooker operates at about 250 °C.

²² Brandon works medical and security. I met him on Linked In.

²³ <https://morgsatlarge.wordpress.com/2011/03/13/why-i-am-not-worried-about-japans-nuclear-reactors/>

Relief efforts impeded (1 Mar 13)

Such problems, with the public information, are impeding efforts to get relief to the Japanese people. My contacts are being advised that our deployment to assist in logistics, communications and security for aid workers is being held up by the threat of the radiological activity. This of course means that the 160,000 people unaccounted for and the possible hundreds of thousands of others with immediate needs are having those needs unmet by the inability of responders local and foreign to assist them. This of course is complicated by the already reeling effects of the infrastructure damage to transportation and communications.

Defense in Depth (1 Mar 15)

The nuclear fuel is in something called “the core” where nothing will melt until 2200 to 3000 °C, so any cooling failure is not going to mess that up. This in turn has a second containment which also protects interior for several hundred °C. The entire hardware is in a third containment a hermetically (air tight) sealed, very thick bubble of the strongest steel and concrete. The third containment is designed, built and tested for one single purpose: To contain, indefinitely, a complete core meltdown.²⁴

This third containment is then surrounded by the reactor building. The reactor building is an outer shell that is supposed to keep the weather out, but nothing in. (This is the part which was damaged in explosion # 1, but more to that later).

He writes what happened in Chernobyl and why that cannot happen in Japan.

After the control rods got put in, the uranium stopped generating heat.

There is a second type of radioactive material created, outside the fuel rods.²⁵

The big main difference: Those radioactive materials have a very short half-life, which means that they decay very fast and split into non-radioactive materials. By fast he means seconds. So if these radioactive materials are released into the environment, yes, radioactivity was released, but no, it is not dangerous, at all. Why? By the time you spelled “R-A-D-I-O-N-U-C-L-I-D-E”, they will be harmless, because they will have split up into non radioactive elements.

Nuclear plants ready for 8.2 quake (1 Mar 15)

The earthquake that hit Japan was 8 times more powerful than the worst earthquake the nuclear power plant was built for (the Richter scale works logarithmically; the difference between the 8.2 that the plants were built for and the 9.0 which happened is 8 times, not 0.8). So the first hooray for Japanese engineering, everything held up.

²⁴ Later I wish to ask about supposed failure of Chernobyl containment. Was that news based on incomplete understanding of the science, or did Chernobyl get containment inferior by Fukushima standards.

²⁵ There is a third type, but its impact on Japan has also been microscopic.

When the earthquake hit with 9.0, the nuclear reactors all went into automatic shutdown. Within seconds after the earthquake started, the control rods had been inserted into the core and nuclear chain reaction of the uranium stopped. Now, the cooling system has to carry away the residual heat. The residual heat load is about 3% of the heat load under normal operating conditions.

The earthquake destroyed the external power supply of the nuclear reactor. That is one of the most serious accidents for a nuclear power plant, and accordingly, a “plant black out” receives a lot of attention when designing backup systems. The power is needed to keep the coolant pumps working. Since the power plant had been shut down, it cannot produce any electricity by itself any more.

Tsunami destroyed backup generators (1 Mar 13)

Things were going well for an hour. One set of multiple sets of emergency Diesel power generators kicked in and provided the electricity that was needed. Then the Tsunami came, much bigger than people had expected when building the power plant (see above, factor 8). The tsunami took out all multiple sets of backup Diesel generators.

When designing a nuclear power plant, engineers follow a philosophy called “Defense of Depth”. That means that you first build everything to withstand the worst catastrophe you can imagine, and then design the plant in such a way that it can still handle one system failure (that you thought could never happen) after the other. A tsunami taking out all backup power in one swift strike is such a scenario. The last line of defense is putting everything into the third containment (see above), that will keep everything, whatever the mess, control rods in our out, core molten or not, inside the reactor.

When the diesel generators were gone, the reactor operators switched to emergency battery power. The batteries were designed as one of the backups to the backups, to provide power for cooling the core for 8 hours. And they did.

Within the 8 hours, another power source had to be found and connected to the power plant. The power grid was down due to the earthquake. The diesel generators were destroyed by the tsunami. So mobile diesel generators were trucked in.

Replacement Power wouldn't work (1 Mar 15)

This is where things started to go seriously wrong. The external power generators could not be connected to the power plant (the plugs did not fit). So after the batteries ran out, the residual heat could not be carried away any more.

At this point the plant operators begin to follow emergency procedures that are in place for a “loss of cooling event”. It is again a step along the “Depth of Defense” lines. The power to the cooling systems should never have failed completely, but it did, so they “retreat” to the next line of defense. All of this, however shocking it seems to us, is part

of the day-to-day training you go through as an operator, right through to managing a core meltdown.

It was at this stage that people started to talk about core meltdown.²⁶ Because at the end of the day, if cooling cannot be restored, the core will eventually melt (after hours or days), and the last line of defense, the core catcher and third containment, would come into play.

But the goal at this stage was to manage the core while it was heating up, and ensure that the first containment (the Zircaloy tubes which contain the nuclear fuel), as well as the second containment (our pressure cooker) remain intact and operational for as long as possible, to give the engineers time to fix the cooling systems.

It is not clear at this writing, which of several cooling systems was in failure.

The operators use whatever cooling system capacity they have to get rid of as much heat as possible, but the pressure starts building up. The priority now is to maintain integrity of the first containment (keep temperature of the fuel rods below 2200°C), as well as the second containment, the pressure cooker.

So they started venting steam. The temperature at this stage was about 550°C.

News reports about “radiation leakage” entirely misleading. (see above)

Plan B – Sea Water (1 Mar 14)

At some stage during this venting, explosion # 1 occurred. The explosion took place outside of the third containment (our “last line of defense”), and the reactor building. Precise info has not yet come out, so Dr. O speculates what probably happened.

The cooling could not be restored before there was some (very limited, but still) damage to the casing of some of the fuel. It is confirmed that a very small amount of Cesium and Iodine was measured in the steam that was released into the atmosphere.

It seems this was the “go signal” for a major plan B. The small amounts of Cesium that were measured told the operators that the first containment on one of the rods somewhere was about to give. The Plan A had been to restore one of the regular cooling systems to the core. Why that failed is unclear. He speculates about that.

Pure water does not get activated much, so stays practically radioactive-free. Dirt or salt in the water will absorb the neutrons quicker, becoming more radioactive. This has no effect whatsoever on the core – it does not care what it is cooled by. But it makes life more difficult for the operators and mechanics when they have to deal with activated (i.e. slightly radioactive) water.

²⁶ Maybe informed physicists started here. TV news speculators began talking worst possibilities from very beginning of quake and tsunami. Maybe they remembering TV movie about tornado which strikes nuclear power plant, twice.

But Plan A had failed – cooling systems down or additional clean water unavailable – so Plan B came into effect. He speculates about that.

In order to prevent a core meltdown, the operators started to use sea water to cool the core.

The nuclear fuel has now been cooled down.

Also, boric acid has been added to the seawater. Boric acid is “liquid control rod”. Whatever decay is still going on, the Boron will capture the neutrons and further speed up the cooling down of the core.

Some Q+A (1 Mar 15)

Q: Some of this has a 30 year half life, so how can we say it dissipated almost immediately?

A: The Cesium was in trace amounts and dispersed via the prevailing winds over the ocean. It then reacts immediately with water to produce cesium hydroxide (CsOH) and is dissipated.

Bottom Line (1 Mar 13)

The plant had come close to a core meltdown. But this worst-case scenario was avoided.

Now, where does that leave us?

- The plant is safe now and will stay safe.
- Japan is looking at an INES Level 4 Accident: Nuclear accident with local consequences. That is bad for the company that owns the plant, but not for anyone else.
- Some radiation was released when the pressure vessel was vented. All radioactive isotopes from the activated steam have gone (decayed). A very small amount of Cesium was released, as well as Iodine. If you were sitting on top of the plants’ chimney when they were venting, you should probably give up smoking to return to your former life expectancy. The Cesium and Iodine isotopes were carried out to the sea and will never be seen again.
- There was some limited damage to the first containment. That means that some amounts of radioactive Cesium and Iodine will also be released into the cooling water, but no Uranium or other nasty stuff (the Uranium oxide does not “dissolve” in the water). There are facilities for treating the cooling water inside the third containment. The radioactive Cesium and Iodine will be removed there and eventually stored as radioactive waste in terminal storage.
- The seawater used as cooling water will be activated to some degree. Because the control rods are fully inserted, the Uranium chain reaction is not happening. That means the “main” nuclear reaction is not happening, thus not contributing to the activation. The intermediate radioactive materials (Cesium and Iodine) are also almost gone at this stage, because the Uranium decay was stopped a long time ago. This further reduces the activation. The bottom line is that there will be some low level of activation of the seawater, which will also be removed by the treatment facilities.

- The seawater will then be replaced over time with the “normal” cooling water
- The reactor core will then be dismantled and transported to a processing facility, just like during a regular fuel change.
- Fuel rods and the entire plant will be checked for potential damage. This will take about 4-5 years.
- The safety systems on all Japanese plants will be upgraded to withstand a 9.0 earthquake and tsunami (or worse)
- He believes the most significant problem will be a prolonged power shortage. About half of Japan’s nuclear reactors will probably have to be inspected, reducing the nation’s power generating capacity by 15%. This will probably be covered by running gas power plants that are usually only used for peak loads to cover some of the base load as well. That will increase your electricity bill, as well as lead to potential power shortages during peak demand, in Japan.

NUCLEAR AROUND WORLD HISTORY (1 MAR 25)

The news media has been comparing their fantasy science fiction projections in Japan to Chernobyl (worst nuclear accident in world history) and Three Mile Island (worst nuclear accident in USA) apparently ignorant of many others in world history.

Here are places that explain nuclear science, what’s going on in Japan, and how this should influence future nuclear policy decisions in our nation.

[Nuclear reactors around the world.](#)²⁷

Nuclear Reactors in Japan

<http://japan.resiliencesystem.org/map-nuclear-reactors-japan>

To stay informed on Japan nuclear accident situation, forget the usual media outlets and consult the following websites,²⁸ and links from those sites to related articles.

<http://mitnse.com/>

MIT is clearly distinguishing between dose levels in the operating areas of the plant and dose levels at the perimeter, and getting the milli/micro stuff right. Releases to the environment still look not too bad. I’m concerned that contaminated water may have been flushed to sea though, either by the tsunami or due to pumping operations. There’s been nothing on that except some dose rate data taken in air near the normal water outlets, and not even that lately.²⁹

http://www.world-nuclear-news.org/RS_Battle_to_stabilise_earthquake_reactors_1203111.html

²⁷ http://en.wikipedia.org/wiki/List_of_nuclear_reactors

²⁸ <https://morgsatlarge.wordpress.com/2011/03/13/why-i-am-not-worried-about-japans-nuclear-reactors/>

²⁹ Thanks to Stephen for this update.

World Nuclear News on Facebook:³⁰ If you have problems accessing the WNN website the articles are being reproduced in the Notes section of the World Nuclear News facebook page.

<http://bravenewclimate.com/2011/03/12/japan-nuclear-earthquake/>

<http://ansnuclearcafe.org/2011/03/11/media-updates-on-nuclear-power-stations-in-japan/>

IAEA Alert Log <http://www.iaea.org/press/>

IAEA Facebook Page³¹ = <http://www.facebook.com/iaeaorg?sk=wall>

Then there are places that SOUND credible, but I do not know if they are factual, or a place distorted by an agenda.

- World Nuclear Association on Facebook³²

Thanks to major problems with news media coverage, many people are asking similar questions. So we need to go to primary sources for clarification.

- **Crisis Commons** has put together a Japan Data Profile wiki containing various data sources relevant to the Japan earthquake and tsunami response:
http://wiki.crisiscommons.org/wiki/Japan_Data_Profile
- **Gov of Japan** info <http://www.kantei.go.jp/foreign/index-e.html> in English.
- IAEA updates on evolving situation in Japan.
<http://www.iaea.org/newscenter/news/tsunamiupdate01.html> and
<http://www.iaea.org/newscenter/news/>
- Recent **radiation** readings http://eq.wide.ad.jp/index_en.html in English, with comparison of what is normal daily life, and <http://eq.sakura.ne.jp>.
 - Radiation + Wind = go where? <http://japan.resiliencesystem.org/winds-japan-power-plants-should-send-radiation-out-sea>
- World Health Organization (WHO) info on health risks associated with various levels of radiation, with some FAQ on Japan situation.
<http://www.who.int/hac/crises/jpn/faqs/en/index.html>
- OCHA = UN agency in charge of coordination of humanitarian relief. Their Relief Web hosts regular updates from many humanitarian efforts at <http://www.reliefweb.int/rw/dbc.nsf> including the Japan crises.

NUCLEAR ACCIDENT HISTORY (1 MAR 12)

This is not the worst case scenario.

<http://img847.imageshack.us/img847/438/fallout.jpg>

³⁰ <http://www.facebook.com/WorldNuclearNews?sk=notes>

³¹ It is not yet obvious to me what time zone is being used here.

³² <http://www.facebook.com/pages/World-Nuclear-Association/133565934222?sk=wall>

Chernobyl and Three Mile Island are well known nuclear accidents, but they are not the only ones. There's Sellafield and Hanford.

A reactor stack caught fire in the 1950s and spewed radioactive particles over a serene countryside.

Radioactivity also has been discharged directly into the nearest body of water. In 1974 nearly 5,000 curies were flushed into the Irish Sea. (The Three Mile Island accident in Pennsylvania released 15 to 28 curies.) After technical improvements, today 8.5 curies still seep out of Sellafield every year.

<http://www.seattlepi.com/specials/eternity/d1.html>

Chernobyl Cracking Open (1 Mar 12)

We aren't finished with Chernobyl. The scientists admit that the sarcophagus which encases the damaged nuclear reactor is now cracking open and leaking out lethal doses of radiation.

In 1988 Soviet scientists announced that the sarcophagus was only designed for a lifetime of 20 to 30 years.³³ Holes and fissures in the structure now cover 100 square meters, some of which are large enough to drive a car through. These cracks and holes are further exacerbated by the intense heat inside the reactor, which is still over 200 degrees Celsius. The sarcophagus's hastily and poorly built concrete walls, which are steadily sinking, act as a lid on the grave of the shattered reactor.

Of course there's an (expensive) effort to do something about this.

<http://www.chernobyl-international.com/chernobyl-sarcophagus.html>

Civilian Nuclear Accidents (1 Mar 26)

http://en.wikipedia.org/wiki/List_of_civilian_nuclear_accidents

http://en.wikipedia.org/wiki/Lists_of_nuclear_disasters_and_radioactive_incidents

<http://www.world-nuclear-news.org/nerinfo.aspx?id=11634>

2 dozen and counting prior to 2011

To do list = since Japan now is category 3-5 nuclear accidents, look into additional info on some of the other category 3-5 incidents.

- 1952 [Chalk River, Ontario](#), Canada INES-5
- 1957 [Windscale](#), Cumberland (now [Sellafield](#), Cumbria) INES-5 = worst in Britain
- 1958 [Chalk River, Ontario](#), Canada INES-???
- 1958 [Vinča, Yugoslavia](#) INES-???
- 1959 [Santa Susana Field Laboratory, California](#), United States INES-???
 - Chuck tells me this was a core melt down incident
- 1964 [Charlestown, Rhode Island](#), United States INES-???
- 1966 [Monroe, Michigan](#), United States INES-???
- 1966-1967 The [Soviet icebreaker Lenin](#), the [USSR](#)'s first nuclear-powered [surface ship](#). INES-???
- 1967 [Dumfries and Galloway](#), Scotland, United Kingdom INES-???

³³ Translation 2008 to 2018.

- 1969 [Lucens, Canton of Vaud](#), Switzerland INES-???
- 1977 [Jaslovské Bohunice, Czechoslovakia](#) INES-4
- 1979 [Middletown, Dauphin County, Pennsylvania](#), United States = 3 mile island, worst in USA³⁴ INES-5
 - TMI got the 5 for spilling the core (or part of the core) onto the containment building floor, not for releasing anything to the environment.
- 1980 [Orléans](#), France INES-4
- 1981 [Tsuruga](#), Japan INES-2
- 1983 [Buenos Aires, Argentina](#) INES-4
- 1986 [Prypiat, Ukraine](#) (then [USSR](#)) – Chernobyl is worst so far in world³⁵ INES-7
- 1986 [Hamm-Uentrop](#), Germany (then [West Germany](#)) INES-???
- 1989 [Greifswald](#), Germany (then [East Germany](#)) INES-???
- 1993 [Tomsk](#), Russia INES-4
- 1999 [Ishikawa Prefecture](#), Japan INES-4
- 1999 [Ibaraki Prefecture](#), Japan – INES-4 [Tokamura Criticality](#)³⁶
- 2003 [Paks, Hungary](#) INES-3
- 2005 [Sellafield](#), England, United Kingdom INES-3
- 2005 [Braidwood, Illinois](#), United States INES-???
- 2006 [Erwin, Tennessee](#), United States INES-2
- 2011 For most current Japan Nuclear info, see my “[EOJ Nuclear Time Line](#)” notes and INES scale within my “[Japan Nuclear Glossary](#).”
- 2011 [Fukushima I Nuclear Power Plant](#), Japan INES-5 and 4 Overheating, explosion, radioactivity emergency [Fukushima I nuclear accidents](#)³⁷
- 2011 [Fukushima II Nuclear Power Plant](#), Japan INES-3 Overheating, possible radioactivity emergency³⁸
- 2011 [Onagawa Nuclear Power Plant](#), Japan INES-???- Turbine damage, possible radioactivity emergency (different sources, different understandings) there was a fire in a turbine building on site but not associated with the reactor operations, and therefore was not involved with any radioactive systems.³⁹

Military Nuclear Accidents (1 Mar 28)

http://en.wikipedia.org/wiki/List_of_military_nuclear_accidents

http://en.wikipedia.org/wiki/Lists_of_nuclear_disasters_and_radioactive_incidents

If my count is correct, 64 incidents here.

³⁴ The US Nuclear Regulatory Commission's [Fact Sheet](#) on the event
The TMI 2 Accident: [Its Impact, Its Lessons](#)

³⁵ UN World Health Organization: [Chernobyl: the true scale of the accident](#)
United Nations Chernobyl Forum expert group on health's [report](#)
More info <http://www.world-nuclear.org/info/chernobyl/inf07.html>

³⁶ <http://www.world-nuclear.org/info/inf37.html>

³⁷ Conflicting stories whether the problems with units 1 + 2, or 1+ 3 ... I believe it is 1 + 3.

³⁸ Three reactors had their cooling systems compromised by the earthquake then tsunami.

³⁹ <http://bravenewclimate.com/2011/03/12/japan-nuclear-earthquake/>

- 1942 – [Leipzig, Germany](#) (then [Third Reich](#)) – steam explosion and reactor fire.
- 1945 – [Los Alamos National Laboratory](#), Los Alamos, New Mexico, USA – Accidental criticality.
- 1946 – [Los Alamos National Laboratory](#), Los Alamos, New Mexico, USA – Accidental criticality.
- 1950 – [British Columbia](#), Canada – Non-nuclear detonation of a simulated atomic bomb.
- 1950 – [Albuquerque, New Mexico](#), USA – Loss and recovery of nuclear materials.
- 1950 - [Lebanon, Ohio](#), USA – Non-nuclear detonation of an atomic bomb.
- 1950 – [Rivière du Loup, Québec](#), Canada – Non-nuclear detonation of an atomic bomb.
- 1954 – [Bikini Atoll, Republic of the Marshall Islands](#) (then [Trust Territory of the Pacific Islands](#)) – Nuclear test accident.
- 1955 – [Idaho](#), USA – Partial meltdown.
- 1956 – Over the [Mediterranean Sea](#) – nuclear weapons lost.
- 1956 – [Lakenheath](#) in [Suffolk](#), UK – Nuclear weapons damaged.
- 1957 – [Kirtland AFB](#) in [New Mexico](#), USA – Non-nuclear detonation of an atomic weapon.
- 1957 – Atlantic Ocean – Two weapons jettisoned and not recovered.
- 1957 – [Rocky Flats Plant, Golden, Colorado](#), USA – Fire, release of nuclear materials.
- 1957 – [Kyshtym, Chelyabinsk Oblast](#), Russia (then [USSR](#)) – Explosion, release of nuclear materials.
- 1957 – [Sellafield, Cumbria](#), UK – Reactor core fire.
- 1957 – [Homestead Air Force Base](#), Florida – nuclear bomb burned after B-47 aircraft accident.
- 1958 – [Morocco](#) – Nuclear bomb damaged in crash.
- 1958 – [Savannah, Georgia](#), USA – Nuclear bomb lost.
- 1958 – [Florence, South Carolina](#), USA – Non-nuclear detonation of a nuclear bomb.
- 1958 – [Oak Ridge, Tennessee](#), USA – Accidental criticality.
- 1958 – [Los Alamos, New Mexico](#), USA – Accidental criticality.

- 1959 – [Simi Valley, California](#), USA – Explosion.
- 1959 – [Oak Ridge, Tennessee](#), USA – Explosion.
- 1960 – [New Egypt, New Jersey](#), USA – Nuclear warhead damaged by fire.
- 1960 – [Barents Sea](#), Arctic Ocean – Release of nuclear materials.
- 1961 – [National Reactor Testing Station, Idaho](#), USA – Accidental criticality, steam explosion.
- 1961 – [Goldsboro B-52 crash](#) – Physical destruction of a nuclear bomb, loss of nuclear materials.
- 1961 – [1961 Yuba City B-52 crash](#)
- 1961 – coast of Norway – Near meltdown.
- 1962 - Sahara desert, [French Algeria](#) - Accidental venting of underground nuclear test.
- 1963 - Loss of nuclear reactor.
- 1964 – [Salisbury, Pennsylvania](#) and [Frostburg, Maryland](#), USA – Accidental loss and recovery of thermonuclear bombs.
- 1964 – Indian Ocean – Launch failure of a [RTG](#) powered satellite.
- 1964 - [Bunker Hill Air Force Base](#), USA – Fire, radioactive contamination
- 1965 – [Livermore, California](#), USA – Release of nuclear materials.
- 1965 – [Rocky Flats Plant, Golden, Colorado](#), USA – Fire, exposure of workers.
- 1965 – coast of Japan – Loss of a nuclear bomb.
- 1966 – [Palomares incident](#) – Accidental destruction, loss and recovery of nuclear bombs.
- 1968 – [1968 Thule Air Base B-52 crash, Greenland](#) – Loss and partial recovery of nuclear bombs.
- 1968 – 740 km (400 nmi) southwest of the [Azores](#) – Loss of nuclear reactor and two [W34](#) nuclear warheads.
- 1968 – location unknown – loss of cooling, radioactive contamination, nuclear fuel damaged.
- 1968 – [Severodvinsk](#), Russia (then [USSR](#)) – Reactor power excursion, contamination.
- 1969 – [Rocky Flats Plant, Golden, Colorado](#), USA – Plutonium fire, contamination.

- 1970 – [Bay of Biscay](#) – Loss of a nuclear submarine.
- 1970 – [Nevada Test Site](#) – Accidental venting of nuclear explosion.
- 1971 – [New London, Connecticut](#), USA – Spill of irradiated water.
- 1972 – [Pawling, New York](#), USA – Contamination.
- 1975 – location unknown – Contamination.
- 1975 – Apra Harbor, [Guam](#) – spill of irradiated water.
- 1976 – [Benton County, Washington, USA](#) – Explosion, contamination of worker.
- 1977 – coast of [Kamchatka](#) – loss and recovery of a nuclear warhead.
- 1978 – [North West Territories, Canada](#) – spill of nuclear fuel.
- 1978 – near [Puget Sound, Washington, USA](#) – spill of irradiated water.
- 1980 -- [Little Rock Air Force Base's](#) Launch Complex 374-7 in Southside (Van Buren County), just north of [Damascus, Arkansas](#), destroyed, without any radiation leakage.
- 1982 – Submarine damaged, which took 9 years to repair.
- 1983 – The Soviet nuclear-powered spy satellite [Kosmos 1402](#) burns up over the South Atlantic.
- 1985 – About 35 miles (56 km) from [Vladivostok](#) a submarine reactor explosion, with lots of radiation.
- 1986 – The U.S. government declassifies 19,000 pages of documents indicating that between 1946 and 1986, the [Hanford Site](#) near [Richland, Washington](#), released thousands of [US gallons](#) of radioactive liquids.
- 1986 – 480 miles (770 km) east of [Bermuda, K-219](#), submarine explosion then sunk.
- 1988 – At the nuclear trigger assembly facility at [Rocky Flats](#) in [Colorado](#), multiple safety breakdowns, causing closure of the plant.
- 1989 – Nuclear poisoning incidents back traced to former USSR training sources abandoned, forgotten, and unlabeled.
- 2003: [Oak Ridge, Tennessee Y-12](#) facility explosion and fire.

NUCLEAR SCIENCE BACKGROUND (1 APR)

I have been meaning to add to this section, but for now, check out my separate research notes with [Japan Nuclear Glossary](#) of acronyms, concepts and terminology.

22 March IAEA Spent Fuel explanation (1 Apr 01)

[International Atomic Energy Agency \(IAEA\)](#) via OCHA Relief Web⁴⁰ provided [Japan: Fukushima Nuclear Accident Update \(22 March 2011 15:30, 16:45, 18:00 UTC\)](#), with 5 page 36k PDF, which I downloaded, naming it “**IAEA 22 March 6 pm**”. It explains nuclear science and how Japan conducts affairs with spent fuel rods.

Spent fuel removed from a nuclear reactor is highly radioactive and generates intense heat. This irradiated fuel needs to be actively cooled for one to three years in pools that cool the fuel, shield the radioactivity, and keep the fuel in the proper position to avoid fission reactions. If the cooling is lost, the water can boil and fuel rods can be exposed to the air, possibly leading to severe damage and a large release of radiation.

Nuclear power plants must replace fuel every one to two years, and the Fukushima Daiichi reactors typically remove about 25 percent of the reactor's fuel - to be replaced with fresh, or unirradiated, fuel - during each refuelling outage. The spent fuel, which is hottest immediately after it is removed from the reactor, is placed in the spent fuel pool until it is cool enough to be moved to longer-term storage.

Due to the tsunami, ability to cool the spent fuel has been compromised.

Number of Fuel Assemblies in Cooling Pools at Fukushima Daiichi *(Reported 17 March by Japan's Ministry of Economy, Trade and Industry)*

Numbers in this chart:

Unit – Most recent additions of irradiated – Capacity – Irradiated Count – Unirradiated Count

- 1 – 2010 Mar - 900 - 292 - 100
- 2 – 2010 Sep – 1260 - 587 - 28
- 3 – 2010 Jun - 1220 - 514 - 52
- 4 – 2010 Nov - 1590 – 1331 - 204
- 5 – 2011 Jan – 1590 - 946 - 48
- 6 – 2010 Aug – 1770 - 876 - 64

31 March analysis of Japan Accidents (1 Mar 31)

According to Professor Magdi Ragheb, Ph.D. (of the University of Illinois Nuclear, Plasma and Radiological Engineering (NPRE) Department),⁴¹ Japan gets 30% of its electrical power from 17 Nuclear Power Plant Sites which collectively have 55 Nuclear Power Reactors. Official records going back to 1600 led the Fukushima plant to be designed to withstand up to 8.6 magnitude earth quake. The 9.0, which arrived, was 4 times more powerful than that.

The Fukushima Dai-ichi plant is on a 14-23 foot high cliff, offering partial protection against tsunamis, then beyond that are 18 foot breakwaters, protecting against tropical storms but not tsunamis. The 9.5 quake in Chile caused a 10.5 foot tsunami, so they figured their

⁴⁰ <http://www.reliefweb.int/rw/rwb.nsf/db900sid/EGUA-8F7RNF?OpenDocument&rc=3&cc=jpn> OCHA Relief Web

⁴¹ Everything you (n)ever wanted to know about Nuclear Power Engineering
<https://netfiles.uiuc.edu/mragheb/www/NPRE%20402%20ME%20405%20Nuclear%20Power%20Engineering/>

protection was high enough.⁴² But as we now know, the 9.0 Japan quake caused a 33 foot high tsunami at Fukushima Dai-ichi, higher at some other places.

The Onagawa plant is approx 15 meters above sea level.

The earthquake followed by tsunami meant that they lost both external power and internal power. Loss of both power sources is called a “Station Blackout Accident.” This in turn led to a “Loss of Coolant Accident” similar to Three Mile Island. Radiation levels inside Fukushima Dai-ichi Unit 1 control room went to 1000 times normal, while outside the plant to 8 times normal.

The tsunami taking out the diesel generators meant they had an electrical black out of both cooling and control functions. There were failed attempts to supply replacement batteries and generators in time to avoid a worse crisis. It took several weeks to lay replacement power lines to the Fukushima Dai-ichi power plant to run the pumps for the cooling, assuming things work Ok, after the disruption time.

After multiple parallel efforts, most of the water for cooling was delivered by water cannon by fire trucks.

The situation evolved beyond what the design could handle.

Fukushima Dai-ichi Units 1-4 are adjacent, so explosions at one could be disruptive to adjacent. Units 5-6 were further away. When there are multiple nuclear accidents, high radiation between them is unclear from which site the trouble is coming.

Fukushima Dai-ichi had just the 4 units, Onagawa had 3, and Tohoku had 1.

Onagawa was the closest to earthquake epicenter, so its tsunami was the highest.

Each of these 4 nuclear plant sites, with an aggregate of 14 nuclear power reactors, suffered from the earthquake and tsunami. Later aftershocks affected other nuclear sites.

Collectively these shutdowns eliminated 20% of Japan’s nuclear electricity capacity.

Fukushima Dai-ichi Unit-1:

- Venting steam, there was hydrogen in there, which led to March 13 explosion, blowing off the roof of the reactor building, but not breaching containment of the 400 fuel rods in the core.
- However 292 fuel rods were in the spent fuel pool, outside containment, and now exposed by the roof blown off in the explosion.

Fukushima Dai-ichi Unit-2:

42

<https://netfiles.uiuc.edu/mragheb/www/NPRE%20402%20ME%20405%20Nuclear%20Power%20Engineering/Fukushima%20Earthquake%20and%20Tsunami%20Station%20Blackout%20Accident.pdf>

- Venting steam, there was hydrogen in there, which led to March 15 explosion, blowing off the roof of the reactor building, but not breaching containment of the 548 fuel rods in the core.
- However 587 fuel rods were in the spent fuel pool, outside containment, and now exposed by the roof blown off in the explosion.
- Also the pressure suppression pool was damaged in the explosion.

Fukushima Dai-ichi Unit-3:

- Venting steam, there was hydrogen in there, which led to March 14 explosion, blowing off the roof of the reactor building, and now containment of the 548 fuel rods in the core, was seen to have a long vertical crack down the side..
- However 587 fuel rods were in the spent fuel pool, outside containment, and now exposed by the roof blown off in the explosion.
- This was the most powerful of the three explosions. It damaged the reactor vessel and the pressure suppression pool.

Fukushima Dai-ichi Unit-4:

- While the core had been shut down for maintenance, the spent fuel pool had 1,331 fuel rods, of which 548 had recently got there from the core. March 15 there was an apparent hydrogen explosion there. This implies loss of cooling there led to high enough temperatures to melt fuel cladding, reach criticality, and risk melt down. The place was on fire for 2 hours March 15, went out, then re-ignited March 16.
- The spent fuel pool was near the top floor, now open to atmosphere, due to the roof blown off in the explosion.

Fukushima Dai-ichi Unit-5:

- The core had been shut down for maintenance, with 548 fuel rods there, and the spent fuel pool had 946 fuel rods.
- Workmen knocked holes in ceiling so hydrogen could vent, without hydrogen explosion. This means the spent fuel pool was also open to the atmosphere.

Fukushima Dai-ichi Unit-6:

- The core had been shut down for maintenance, with 764 fuel rods there, and the spent fuel pool had 876 fuel rods.
- Workmen knocked holes in ceiling so hydrogen could vent, without hydrogen explosion. This means the spent fuel pool was also open to the atmosphere.

Fukushima Dai-ni Unit-4 (of 4 units total):

- There was a hydrogen explosion here also.

Because Fukushima Dai-ni retained its external power supply, most of that facility was able to recover according to design.

Onagawa

- There was a fire in a turbine, believed to be due to overload due to the earthquake.
- There was a coolant leak in one of the 3 reactors.

The best way to cool the mess depends on the nature of the mess, and what resources can be brought in, given the wider national disaster in the aftermath of the tsunami.

RADIATION INTO PERSPECTIVE (1 APR 23)

- US EPA resources for environmental information regarding radiation
<http://www.epa.gov/radiation/>
- Japanese Nuclear Emergency: Radiation Monitoring - from the EPA
<http://www.epa.gov/radiation/rert/radnet-sampling-data.html>
- RadNet Laboratory Analysis - from the EPA
<http://opendata.socrata.com/Government/RadNet-Laboratory-Analysis/cf4r-dfwe>
- Read more at <http://japan.resiliencesystem.org/environmental-protection-agency-epa>.

We are told that this or that dose is less that we would get at a doctor office. I sought radiation intensities associated with various ordinary incidents other than what's going on in Japan, to put that in perspective. This is on page 4 of a Radiation PDF which I have downloaded, and can send along to people. Lots of graphics there, so I not adding here. However something very similar at end of this sub-section "chapter."⁴³

I learn that we are hampered because

- Some science measurement symbols not on our keyboards, nor easily get at, but maybe we can copy-paste them with explanation here.
- M = mili-meter (why not use MM?),
- M = micro-meter (this "science" system is overdue to fix), and
- M = meter

⁴³ Also ask me for a copy of **Radiation Basics** which I got from Stuart Leiderman.

I am seeing radiation intensities in stories out of Japan in the following units: (sources)

mSv to 10 uSv/hr (IAEA news)

18,000 cpm to greater than 100,000 cpm (testing evacuated residents in NISA report)

A reading up to 1,204.2μSv was recorded in what got vented. (briefing by Japan government)

An [article](#) in Mainichi Daily News (Japan, English version) has statement by public health center manager in Minamisoma that more than 8,000 ppl tested for radiation and none needed to be decontaminated. Followed on by statement from Professor Koichi Tanigawa, head of Hiroshima University Hospital's Advanced Emergency and Critical Care Center stating "It's impossible that radiation exceeding the upper limit set by govt standards is detected in anybody except those engaged in special work at nuclear power plants."⁴⁴

A Japanese government agency has released the results of radiation measurements at dozens of monitoring posts. See the data [here](#).⁴⁵

According to <http://mitnse.com/>

Normally nuclear workers are allowed to receive a dose of 20 millisieverts per year, although in practice they often receive very much less. If that limit is exceeded in any year, the worker cannot undertake nuclear duties for the remainder.

In emergency circumstances safety regulators allow workers to receive up to 100 millisieverts with the same conditions applying, that they must leave the site should that limit be reached. The 100 millisievert level is roughly the point at which health effects from radiation become more likely. Under a special allowance from the Nuclear and Industrial Safety Agency (NISA), workers at Fukushima were permitted doses of up to 250 millisieverts.

Health effects vary depending on size of dose at one time, what element isotopes involved.

note: 1 Rem = 1000 millirem; 1Sv = 1000 millisievert

Cumulative Dose = Dose Rate x Time Exposed

Also see my research notes document “[Japan Nuclear Glossary](#).”

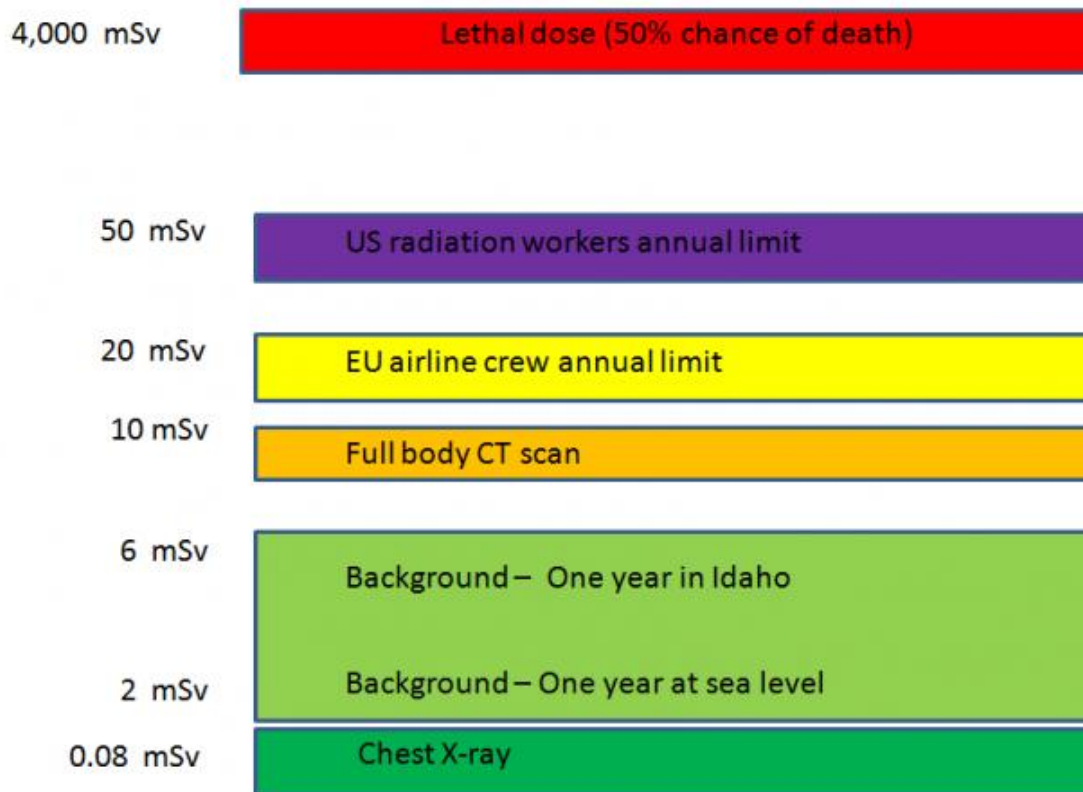
Page left intentionally blank before following charts, so all of it on same page.

⁴⁴ <http://mdn.mainichi.jp/mdnnews/national/news/20110329p2a00m0na010000c.html>

⁴⁵

http://www.mext.go.jp/component/a_menu/other/detail/_icsFiles/afieldfile/2011/03/18/1303727_1716.pdf.

Radiation Exposures



Source of Radiation	Dose in millirem (mrem) or Dose Rate (mrem/hr)	Dose in milliSv (mSv) or Dose Rate (mSv/hr)
Background (average in U.S.)	~360 millirem per year (1 millirem per day)	3.6 milliSievert
Chest X-ray	~8 millirem per X-ray	.08 milliSievert
CT scan of abdomen	~800 millirem	8 milliSievert
A cross country flight in the U.S.	2-5 millirem	0.02 - 0.05 milliSievert
Regulatory limit for radiation workers	5000 millirem per year	50 milliSievert

Radiation Scam (1 Mar 17)

In recent days a map has circulated the internet, purporting to predict high doses to the Western U.S. This map bears the seal of the Australian Radiation Service, which did not produce it. The map has been refuted by the U.S. NRC, and experts state that it more closely resembles predictions for doses after deployment of a nuclear weapon than those for a situation such as that unfolding at present.⁴⁶

JAPAN RADIATION REALITY (1 APR 25)

Also see my document “**Japan Nuclear Glossary.**”

- Recent **radiation** readings http://eq.wide.ad.jp/index_en.html in English, with comparison to what is normal daily life, so as to put into perspective which readings are hazardous, and which are trivial. Also note WHERE those readings took place. Some dangerous ones are actually inside containment, or in radioactive isotopes which change to non-dangerous chemicals when mixed with sea water. You will need to correlate multiple info sources to see when that is the case, and I try to provide all the sources needed for such correlation.

Here is a chart of radiation over time period.

<http://upload.wikimedia.org/wikipedia/commons/2/2f/Fukushima7.png>

DONATING TO NGOS (1 MAR 27)

As usual with any natural disasters, including tornadoes, floods, and earthquakes, a large number of criminals solicit contributions purportedly for a charitable organization or a good cause. People should use due diligence to avoid being suckered.

Five Tips on avoiding charity scams

http://www.net-security.org/secworld.php?id=10755&utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+HelpNetSecurity+%28Help+Net+Security%29

Advice from US FBI: <http://www.ic3.gov/media/2011/110311.aspx>

See info from UN, in my other notes documents. They include links to NGOs claiming to respond to Japan crisis. But do not depend on any one source. Our experience with Haiti has shown many NGOs are far better at fund raising than delivering quality services to disaster victims.

⁴⁶ <http://mitnse.com/>

A list of humanitarian organizations which are accepting cash donations for earthquake and tsunami response efforts in Japan, according to USAID, can be found at www.interaction.org.

Huffington Post

http://www.huffingtonpost.com/2011/03/11/how-to-help-japan-earthquake-relief_n_834484.html

suggests

- Red Cross
- Save the Children
- International Medical Corps
- Global Giving
- Salvation Army
- Doctors without Borders
- Americare
- Shelter Box
- Mercy Corps
- Operation USA
- World Vision
- And others

Time Magazine

<http://newsfeed.time.com/2011/03/11/five-ways-you-can-help-earthquake-and-tsunami-victims-in-japan/> promotes

- Red Cross
- Shelter Box
- International Medical Corps
- Global Giving
- Convoy of Hope
- Salvation Army

CNN / impact <http://www.cnn.com/SPECIALS/impact.your.world/>

Has a variety of guidance suggestions.

Charities helping in Japan

- [AmeriCares](#)

- [International Federation of Red Cross and Red Crescent Societies \(IFRC\)](#)
- [Save The Children](#)
- [Doctors Without Borders](#)
- [Convoy of Hope](#)
- [ShelterBox](#)
- [International Medical Corps](#)

Some of those have done a GREAT job in Haiti, while others have left us with many reasons to be disappointed.

Regardless of how you or I feel about a particular charity, remember that in addition to the familiar ineptitude, venality, etc. there are also crooks who use pictures from OTHER charities to claim this is what THEY are doing, when all they are doing is collecting money. So we need to go to a place like Charity Navigator to check out SOME info available on places that claim to be charities helping in Japan.

<http://www.charitynavigator.org/index.cfm?bay=content.view&cpid=1221>

You can also review my “science of accountability” blog series on Haiti Rewired.

<http://haitirewired.wired.com/group/scientistforhaiti>

Part I = define terms

Part II = evaluations of aid, where it had been totally unacceptable

Part II = responsibilities for donors to give wisely

TRAVEL ADVISORIES (1 APR 01)

[World Health Organization \(WHO\)](#) is NOT advising against travel to Japan, other than in the areas impacted by tsunami and nuclear accidents.⁴⁷

WHAT’S HAPPENING (1 APR 27)

Here are links to “The Horse’s Mouth” on Japan nuclear info, for people who have been overly dependent on the other end of the horse (the news media) and are starving for better information. Primary sources = information from the horse’s mouth, officials directly in charge of managing response to what’s happening. They are in the best position to share the facts.

⁴⁷ <http://www.reliefweb.int/rw/rwb.nsf/db900sid/KHII-8F6B67?OpenDocument&rc=3&cc=jpn> OCHA Relief Web

- **Crisis Commons** has put together a Japan Data Profile wiki containing various data sources relevant to the Japan earthquake and tsunami response: http://wiki.crisiscommons.org/wiki/Japan_Data_Profile
- **Gov of Japan** info <http://www.kantei.go.jp/foreign/index-e.html> in English.
- Nuclear and Industrial Safety Agency: <http://www.nisa.meti.go.jp/english/index.html>
- Office of Prime Minister <http://www.kantei.go.jp/foreign/index-e.html>
- **International Atomic Energy Agency (IAEA)**'s Incident and Emergency Centre (IEC) and IAEA updates on evolving situation in Japan.⁴⁸ <http://www.iaea.org/newscenter/news/tsunamiupdate01.html> and <http://www.iaea.org/newscenter/news/>

IAEA Alert Log <http://www.iaea.org/press/>

The IAEA Alert Log is encountering difficulties due to an enormous increase in web traffic. As an interim solution, updates from the IAEA Incident and Emergency Centre regarding developments from Japan will be provided on [this page](#).

Facebook Page⁴⁹ = <http://www.facebook.com/iaeaorg?sk=wall>

- Recent **radiation** readings http://eq.wide.ad.jp/index_en.html in English, with comparison of what is normal daily life, and <http://eq.sakura.ne.jp>.
 - Radiation + Wind = go where? <http://japan.resiliencesystem.org/winds-japan-power-plants-should-send-radiation-out-sea>
- Tepco = Tokyo Electric Power Company, which runs the two Fukushima nuclear power plants, with 10 nuclear reactors between them.
- USN = United States Navy. US navy flew aircraft over the Fukushima power station, where there have been steam releases and explosions. They detected extremely low levels of radiation. It is unclear whether what they detected is what Japan calls “normal” for just outside the power plant, or if it is related to recent events.⁵⁰
- World Health Organization (WHO)⁵¹ info on health risks associated with various levels of radiation, with some FAQ on Japan situation. <http://www.who.int/hac/crises/jpn/faqs/en/index.html> WHO situation reports. http://www.wpro.who.int/sites/eha/disasters/2011/jpn_earthquake/list.htm other WHO info on Japan situation <http://www.who.int/hac/en/index.html>
- OCHA = UN agency in charge of coordination of humanitarian relief. Their Relief Web hosts regular updates from many humanitarian efforts at

⁴⁸ IAEA is an agency of the United Nations.

⁴⁹ It is not yet obvious to me what time zone is being used here.

⁵⁰ http://www.navy.mil/search/display.asp?story_id=59065

⁵¹ WHO is an agency of the United Nations.

<http://www.reliefweb.int/rw/dbc.nsf> = main page, from which you can navigate to info on the crisis of interest to you ... Haiti, Pakistan, New Zealand, Japan, wherever. Notice upper right corner of OCHA Relief Web main page on the Japan 2011 March earthquake and tsunami.

<http://www.reliefweb.int/rw/dbc.nsf/doc108?OpenForm&rc=3&emid=EQ-2011-000028-JPN> You can subscribe to such reports via e-mail, RSS news reader (I use Google Reader), and you can also bookmark key pages for future reference.

Many of the major players, in humanitarian aid, are issuing updates. Typically they share info about the original disaster(s), what that group is doing to help, in a summary format, where each update repeats much of the same info we saw in earlier updates from them. It can often be unclear how much of the recovery aid in the reports are attributed to an aggregate of many groups vs. the one providing the individual report. Many of these updates have nothing to say about the nuclear situation, and when they do say something, they are NOT primary sources, so they could be influenced by news media fantasy land.

See my “**EOJ Sitreps**” notes for links to many individual situation reports on the non-nuclear aspects of the disaster in Japan. I have a “**Maps Directory**” to sources for Haiti, Japan, Democracy into Middle East, other topics.

Some primary sources may distort or cover up something to reassure general public, try to avoid panic. Individual spokespersons may lack ability to communicate science risks effectively. Translation from Japanese may lose some essential details. There will be time lags between technicians dealing with latest crisis, and info about it filtering through their management PR. But any inaccuracies, misunderstanding should be minimized. Here we are getting best info, the public is going to get, from authorities with closest connections to latest truths.

According to OCHA Relief Web,⁵² on 18 March 2011, [International Atomic Energy Agency \(IAEA\)](#) Director General Yukiya Amano met Japanese Prime Minister Naoto Kan and other senior officials in Tokyo to discuss the current nuclear safety emergency in Japan and the need for increased information disclosure to ensure an effective international response.

The IAEA and the international community are "standing by Japan" in this difficult period.

RADIOACTIVE SEAWATER (1 MAR 26)

As shared here: <http://japan.resiliencesystem.org/nuclear-energy-institute-nei-higher-levels-radioactive-iodine-seawater-detected-march-26-2011>

I replaced “yesterday” and various recent days of week, etc. with actual dates, so this more readable in the future.

⁵² <http://www.reliefweb.int/rw/rwb.nsf/db900sid/KKAA-8F58ZD?OpenDocument&rc=3&cc=jpn> OCHA Relief Web

Submitted by [Kathy Gilbeaux](#) on Sat, 2011-03-26 16:48

UPDATE AS OF 9:30 A.M. EDT, MARCH 26, 2011

Japanese scientists March 25 detected higher levels of radioactive iodine in seawater at water outlets near the Fukushima Daiichi nuclear power plant.

"[Iodine 131](#) was detected at a level 1,250 times the national safety limit," [Hidehiko Nishiyama](#) of the Nuclear and Industrial Safety Agency said during a news conference. Officials said there is no immediate danger to residents near the plant from these levels.

Samples taken March 25 were significantly higher than those taken March 23, which had 147 times the legal concentration of I-131. Authorities said the concentration of radioactive materials in the water will decrease as the water is diluted by ocean currents. Indeed, a sample taken at 8:50 a.m. March 25 had one-fifth the concentration of I-131 as the earlier measurement. Three subsequent measurements that morning showed fluctuation. All were below the highest level found at 8:30 a.m. on Friday.

"As of now, there is no report of adverse impact on the marine life, especially beyond kilometers [of the plant]," said Chief Cabinet Secretary Yukio Edano. "Experts say there is a very low possibility, but we must strengthen our monitoring."

Efforts to cool the reactors and fuel pools continues at the Daiichi site. [Freshwater is now being used to cool reactors 1, 2 and 3](#) in lieu of seawater. Workers began injecting fresh water at reactors 1 and 3 on March 25 and at reactor 2 on March 26. Meanwhile, two U.S. Navy barges carrying 500,000 gallons of freshwater are en route to a port 37 miles south of the Fukushima plant.

<http://nei.cachefly.net/newsandevents/information-on-the-japanese-earthquake-and-reactors-in-that-region/>

(Click below for earlier NEI updates)

<http://nei.cachefly.net/newsandevents/information-on-the-japanese-earthquake-and-reactors-in-that-region/japan-earthquake-additional-nei-updates/>

WIKIPEDIA AND OTHER FAQ (1 MAR 27)

Information pouring into Wikipedia – check out links there.

http://en.wikipedia.org/wiki/2011_Sendai_earthquake_and_tsunami

Japan Resilience System working group has started. <http://japan.mphise.org/>

SECONDARY SOURCES (1 APR 14)

Visit USA.gov's new page, [Japan 2011 Earthquake and Tsunami -- U.S. Government Information](#). You'll find a variety of resources from across the government, including:

- Updates on **air quality** and **food safety in the United States**.
- Information about **Potassium Iodide (KI)**.
- Monitoring of **food, mail, and cargo from Japan**.
- Information about **evacuations for Americans in Japan**.
- Advisories on **travel to Japan**.
- Information about **donations** and **relief efforts**.
- **Disaster preparedness** resources.

NATURAL PHENOMENA DISASTERS (1 APR 01)

In contemporary science theory, there is no such thing as a Natural Disaster. All disasters are a combination of natural phenomena, and inadequate human planning to be prepared for such phenomena. I talk about this more in my research notes: [Weather Science Haiti](#).

⁵³ Natural phenomena relevant to Japan latest disaster include: Earthquakes; Tsunamis; Volcanoes.

<http://www.gdacs.org/> Global alerts world wide

Multi-hazard, earthquakes, tsunami, tropical storms, floods, volcanoes

Where are they, how severe, #s of people involved, lists of towns at risk

Tsunami info (1 Mar 28)

Scales of intensity and magnitude for Tsunamis

http://en.wikipedia.org/wiki/Tsunami#Scales_of_intensity_and_magnitude

Tsunami warnings along Japan coastline:

[Japan Meterological Agency: Tsunami Warnings/Advisories \(11 Mar 2011\)](#) ⁵⁴

Info about the 2004 Asian Tsunami, deadliest in recent history

http://en.wikipedia.org/wiki/2004_Indian_Ocean_earthquake_and_tsunami

⁵³ Also see "[Lessons Learned](#)" at end of my [Time Line](#) on Japan [Nuclear Accidents](#).

⁵⁴<http://www.reliefweb.int/rw/rwb.nsf/db900sid/RKRR-8EUPB5?OpenDocument&rc=3&cc=jpn> Summary from OCHA Relief Web
[http://www.reliefweb.int/rw/fullmaps_sa.nsf/luFullMap/46C228D211863FF38525785000640857/\\$File/map.pdf?OpenElement](http://www.reliefweb.int/rw/fullmaps_sa.nsf/luFullMap/46C228D211863FF38525785000640857/$File/map.pdf?OpenElement) Detail color coded with expected heights of tsunami arrival

It was deadly for many reasons. Even though nations theoretically had many hours “warning” it was coming, it came on a weekend, when government offices were not operating, so no one was home to pass on the message it was coming.

Earthquake Info (1 Mar 28)

USGS = United States Geological Survey

<http://earthquake.usgs.gov/earthquakes/>

recent quakes around the world – how severe

<http://earthquake.usgs.gov/earthquakes/pager/>

Previous big quakes (6.5 and up) in Japan

http://en.wikipedia.org/wiki/List_of_earthquakes_in_Japan

Worst earthquake can mean strongest in magnitude, deadliest.

How close it is to surface of ground (where we are) has a difference in how much ground shaking there is. Also condition of ground (fragile buildings, hills subject to land slides), how severe a Tsunami, impacts death rate. Time of day ... does it happen while people asleep, or able to react faster.

News media report the latest quake in Japan is # 5 in history recorded since 1900, while Wikipedia says it is # 7, because it includes quakes back at least to 1700.

I imagine Dinosaurs killing, and prior mass extinctions, involved some pretty big quakes.

Largest Earthquake in recent recorded history = Chile 1960 9.5

http://en.wikipedia.org/wiki/Earthquake#Major_earthquakes

Largest Earthquakes in magnitude

http://en.wikipedia.org/wiki/List_of_earthquakes#Largest_earthquakes_by_magnitude

Here are deadliest on record

http://en.wikipedia.org/wiki/List_of_earthquakes#Deadliest_earthquakes_on_record

Why New Zealand quake was so deadly

<http://www.scientificamerican.com/article.cfm?id=new-zealand-earthquake-christchurch>

Earthquake Predicting (1 Mar 28)

Earthquake prediction science needs to be better funded, so it can improve, but more importantly, politicians need to PAY ATTENTION when seismologists warn that some geography is overdue to get a nasty big one. Perhaps the general public needs a map showing where high risk, so that THEY can better be prepared, since their governments are not paying attention to these updated risk assessments.

Earthquake predicting: Science is constantly improving. It cannot predict WHEN one will come, like with weather prediction, but scientists have been predicting WHERE there is a high risk of one coming soon.

Haiti had a nasty quake Jan 2010, a couple years after earthquake scientists predicted that Haiti was overdue to get a serious one, right around where it actually arrived.⁵⁵ So the quake was a shock to everyone, but not a surprise to earthquake scientists. Two years was not enough time for a lot of preparation, but it was time to improve critical infrastructure such as buildings where fire engines and ambulances parked (so they would not be crushed by those collapsing buildings).

According to 2011 March 19 Economist magazine, Japanese seismologists had warned in Jan 2011 that NE Japan was overdue for a large quake. They calculated that there was a 99% chance of an 8.0 or higher quake in the next 30 years off the Miyagi coast. They were not surprised March 11 by a quake coming pretty close to where they had predicted one, only by its size. Two months advance warning probably was not enough time for a lot of preparation, but it was enough time to build higher sea walls for nuclear power plants, and improve inland tsunami warning systems.

ENVIRONMENTAL RECOVERY (1 APR 01)

As a [follow up](#) to the online conversation, "[Thinking of Japan: how can biochar help to remediate radioactive and contaminated soils?](#)"⁵⁶ from [Biochar Offsets Group on Linked In](#)⁵⁷ "Necessity may be the mother of invention, but innovators need to address problems before they become absolute necessities..."

The Nuclear Forest Recovery Zone: "*The enormity and unprecedented nature of this combined natural and human-made disaster will require a massive and completely novel approach to management and remediation. And with this comes a never before seen opportunity for collaboration, research and wisdom.*" These are the words of **Paul Stamets**, mycologist.

His short essay explains how **an ecological approach** can use *mushrooms and native deciduous trees* to literally "suck up" the radioactivity from a nuclear fallout area which eventually leads to capturing with intent to refine the radioactive mushrooms into ash [or **Biochar?**] and thus trap in glass or other materials, rendering it inactive.

Watch his [TED talk](#) on 6 ways mushrooms can save the world...⁵⁸

⁵⁵ <http://www.pbs.org/wgbh/nova/earth/earthquake-detection.html> Also see links in my **Weather Science Haiti** research notes document.

⁵⁶ <http://www.justmeans.com/-Nuclear-Forest-Recovery-Zone/47319.html>

⁵⁷ <http://www.linkedin.com/groups?home=&gid=2446475>

⁵⁸ <http://www.youtube.com/watch?v=XI5frPV58tY>

AL MAC NUCLEAR DISCLAIMER (1 MAR 25)

Many of us have gut reactions to the concept of nuclear power plants in earthquake active regions, and the wisdom of nuclear energy as part of our total energy policies. Since many people have conflicts of interest and personal political agendas, perhaps I should share my ideology here, viewpoints which could influence my studies and info sharing

I believe it is possible to figure out what the worst natural disaster could be any place, unless we have a Super Volcano,⁵⁹ Giant Meteor Strike,⁶⁰ climate change takes us to Super Storms⁶¹ and other new realities, in which case it probably would not matter to us what human stuff was part of the disruption. Then figure out design, of what is wanted, where critical infrastructure will survive the worst natural disaster which we can expect to occur there.

It may be that it is just too expensive to build a nuclear power plant which can survive a 9.5 earthquake, or a city which can survive a level 5 hurricane, or design a community which won't be put at risk by forest fires, in which case the prudent solution is not to build such structures where such natural phenomena can occur. I believe it is criminally negligent to build only what is affordable, knowing it is at risk of such disasters. If we cannot afford to build safe structures some places, then those places land use should be for something else, such as agriculture, or wet lands.

Given that earthquakes have gone up to 9.5 in the past 100 years, for Japan to design their nuclear power plants to only go up to 8.2 means there must have been either a political economic judgment call, or decisions made by people ignorant of risks in the real world, to design structures at risk of worst case scenario disasters.

Nuclear energy is necessary evil (1 Mar 25)

I consider nuclear energy a necessary evil, where ALL sources of energy come with unpleasant risks and costs. Democracies need informed public to drive wise decisions. Without good info, we get bad decisions cascading into nasty consequences.

This nuclear situation is both Japan's business and rest of world's business.

Japan's because it is inside their national sovereignty policies, and related to Asian culture of saving face.

Rest of world for several reasons:

- Just like the Tsunami went across the Pacific to visit many other nations, any serious radiation leak can go around the world, where nations need to know what's coming.

⁵⁹ There is evidence that in pre-historic times, there have been eruptions big enough to obliterate entire nations.

⁶⁰ The dinosaurs were wiped out by one. There are approx 200 similar sized rocks which cross Earth orbit, so we are playing a kind of Russian Roulette by not funding sufficient space exploration defense to make sure that humanity does not get similarly wiped out.

⁶¹ A storm so large that there is always some of it over water, so it never dissipates.

- Each nation seeks wise energy policies to meet their future needs. Does Japan have best state-of-art nuclear? What happened? Are we at risk of similar, if in fact we also have best possible state-of-art?
- Desire to provide relief to victims of quake and tsunami, is complicated by nuclear uncertainty.
- Impact on a fragile global economy.

All forms of energy come with certain costs and risks.

- Nuclear energy has the kind of risk we have recently seen unfold in Japan, and if you check Wikipedia there's something like this almost every year but not getting the same news media attention. Then there is what to do with the nuclear waste.
- Coal mining cuts short the lives of coal miners, with coal dust into their lungs, and cave-ins.
- Over-dependence on foreign oil has contributed to an astronomical trade deficit and poor foreign policy towards nations which are primary contributors of the oil. In those nations, most of the wealth flows to people who own the land that is mined, undermining development of a good middle class. We may have passed peak oil. It is getting more and more expensive and risky to get at the oil which remains, as we saw with the BP Gulf Oil spill disaster.
- Hydro-electric is dependent on rainfall weather patterns, more effective certain seasons than others. Very few places in the world are suitable for hydro-electric from tides.
- Wind is improving, but also dependent on weather, not a steady source of power.
- Solar is extremely under-utilized, when you consider the high volume of roof tops which could be getting it.
- There are other forms of energy we are not yet utilizing, but there is high expense and risk to develop any of them.

We need to utilize many different forms of energy, where most make more sense one place or another to exploit. We need to solve the political economic barriers to better conservation of energy.

INSPIRATION FOR THIS DOCUMENT (1 MAR 25)

For relaxation, I answer interesting questions on Linked IN. An engineer in Britain⁶² asked a question⁶³ which sounded to me like he was overly dependent on news media sources for what's likely to happen in Japan.

LI question by DK (1 Mar 25)

Background

The media tells us that things are looking much better now in regard to the Japan nuclear crisis and we should all relax about the damaged nuclear reactors in Fukushima. Yet, there is something bothering us in London which makes it difficult for us to relax completely:

1. What does the smoke and vapour being emitted from the various nuclear reactors at the plant actually contain?
2. What if one of the elements being discharged is plutonium -- the deadliest substance known to man -- which is extremely difficult to detect?

Universal Concerns

- . Reactor 3 suffered significant damage after the quake and the tsunami waves on March 11th;
 - . The roof of the building was destroyed by a powerful explosion last week caused by an accumulation of hydrogen;
 - . Reactor 3 raises the most concern since it runs on MOX or Mixed Oxide fuel -- a mixture of plutonium and uranium;
 - . MOX is far more dangerous than uranium on its own; and
 - . MOX is two million times more deadly than normal enriched uranium.
-
- . Reactor 3's recent smoke appears to have originated from the building's side, where the spent nuclear fuel pool is located;
 - . The precise contents of the smoke and vapour at reactor 3, and other reactors, are as yet unknown;
 - . However, workers were evacuated from the nuclear plant after smoke appeared from reactor 3;
 - . No radiation spike has been detected so the common assumption is that all is fine;
 - . Radiation levels are NOT up after the smoke release from reactor 3 which seems to have reassured the global financial markets for the moment;
 - . Should the world relax if we don't as yet know the precise contents of the smoke and

⁶² <http://www.linkedin.com/in/dkmatai>

⁶³ http://www.linkedin.com/answers/Sustainability/energy-development/SUS_ENE/809548-6828686

vapour from reactor 3?

. What if the release of elements in the smoke and vapour were not just radioactive iodine, caesium and uranium but a MOX combination including plutonium?

[Continues]

<http://www.businessinsider.com/japan-nuclear-crisis-what-about-the-plutonium-mox-2011-3>

LI other answers (1 Mar 25)

Some other respondents addressed several statements, he had made, as being in reality urban myth.

Some talked about risks in general vs. aftermath of this disaster so far.

LI answer by Al Mac (1 Mar 25)

The news media talks about worst case scenarios, in their viewpoint, and then reality comes nowhere close, so people think the situation is getting under control.

Reality is, situation has been getting gradually worse, but is nowhere close to any of the news media worst case scenarios.

Look at situation a week after tsunami messed up the nuclear power plant cooling apparatus. They are still struggling to get external power to the plants, there has been partial damage to several cores. The spent fuel pools are in top floors of reactor buildings, without the containment of the cores.

There's multiple design flaws here. Because there was no way to vent the hydrogen which blew the roofs off several buildings (outside the containment), workers knocked holes in other building roofs, so their hydrogen would not build up and cause explosions. The water being dumped by helicopters, and sprayed on buildings, is to cool the spent fuel pools whose water steamed off, could not be pumped back in, by cooling system wiped out by tsunami, and now risk of that radiation escaping through holes in ceilings, created to prevent a hydrogen explosion.

So, things are getting very slowly worse.

Your question comes down to whether you are willing to believe the official reports from Japanese nuclear authorities, UN, USA etc.

- USA sends military planes over the site to measure what radiation is there.

- Japanese authorities test evacuees for contamination, give them iodine medicine, test food, monitor releases, monitor wind direction, and report this to their people several times a day.
- Nuclear power plant companies are checking several things, reporting events to their authorities every hour or so.
- This then gets to IAEA, which releases it to an informed public.
- Nuclear scientists, and physics students study the technical information, which got shared, and explains it for the layman.
- Our news media totally subverts this info.

So you are speculating, what if we cannot trust the info coming from the Japanese, like we often cannot trust the info which comes from our own governments. Or perhaps you do not know how to locate and navigate the info which comes from US Navy over-flights, IAEA daily updates, Japanese several times a day updates, and thus you are overly dependent on a news media which has not had foreign correspondents in eons, where disaster is an undiscovered country (I love Star Trek), which they do not know how to cover with any competence.