HB23-1247 “Assess Advanced Energy Solutions In Rural Colorado” Testimony, 03/29/23

Madam Chair Kipp, members of the committee, thank you for the opportunity to present to you today. My name is Art Curtis, representing myself, and I am here to support this bill because I believe that we should assess all forms of firm, dispatchable 24/7/365 energy, especially advanced nuclear, and their potential advantages for Colorado’s rural communities.

In Colorado, we are planning on closing most of our remaining coal-fired power plants. I believe that replacing these plants with advanced nuclear power plants is our best option for minimizing the impacts of these closures on rural communities. Building transmission lines into southeastern Colorado will open up opportunities for this region to host nuclear power plants and other firm, dispatchable power.

When compared to other energy sources like wind and solar, nuclear power plants take up significantly less land area, and generate power more than 90% of the time. They also provide high-paying, long-term jobs during the 60 to 80 years of their lifetimes: up to 10 times more, higher paying jobs than do wind and solar projects. As such, they will contribute much more to the economic prosperity of our rural communities than would renewable projects.

The existing nuclear fleet in the US is the safest, cleanest form of energy available, providing 20% of our electric power and 50% of our carbon-free power. Modern, advanced reactors would be much safer and enable us to meet our goal of 100% carbon-free power by 2050.

In conclusion, I strongly support HB23-1247 and urge this committee to vote to send it to the House floor.

Thank you. I will answer any questions you may have.

I am opposed to these effortsBeverly Cusick to: committees.lcs.ga@coleg.gov 03/29/2023 09:37 AM

House Bill 1080 Reliable Alternative Energy Sources

House Bill 1247 Assess Advanced Energy Solutions in Rural Colorado

Take care of those who are likely to be or are harmed by industry.

I hope the governor will veto these bills if you pass them.

Beverly Taylor
81435

Total Population Evacuation Zones and Damage Consequences with Nuclear Reactor Spent Fuel Fire Pool Incidents: Terrorist Attacks, Natural Disasters, Accidents/Malfeasance

Testimony to Colorado Legislature, House Committee on Energy and Environment;

March 29, 2023 re: HB23-1247 and HB23-1080

Presented by: Richard D. Andrews, Registered Professional Engineer, Colorado

Founder/President: Boulder Innovative Technologies, Inc.

P.O. Box 19105, Boulder, CO 80308

The following graphics illustrate the radioactive contamination zones that could result from catastrophic incidents at nuclear reactor spent nuclear fuel (SNF) pools. Such incidents could result from:

- intentional terrorist or military attacks on the SNF cooling pools and interim storage facilities,
- natural disasters such as earthquakes/tsunami, as occurred at Fukushima, Japan
- flooding from large storms
- operator error/incompetence, as occurred with Chernobyl, Ukraine
- equipment or instrument failure/malfunction/degradation
- numerous other causes

I place the potential for intentional terrorist attack at the top of this list, since that scenario was considered by the 9/11 terrorists that attacked the World Trade Center and Pentagon. It is documented in the 9/11 Commission official report that those terrorists conducted reconnaissance on the Indian Points Nuclear plant near New York City on the Hudson River. Other targets were ultimately selected

I have personally conducted computer modelling of such a terrorist attack on the Indian Points plant, using computer consequence computer codes publicly available from DOE laboratories. One of the following graphics illustrates that such an attack could be easily conducted on the SNF cooling pools, for example by a commercial aircraft. An attached model graphic illustrates the tragic consequences of one scenario of a terrorist attack. The graphical results illustrate the toxic Cs-137 release from a spent fuel fire, and the mandatory evacuation zones.

Respected nuclear physicist scientists have also conducted computer modelling of spent nuclear fuel fires, caused by any of the above listed events. The following graphic displays of the huge radiological exposure consequences dramatically demonstrate that major human population centers can be made unhabitable for very long time frames. See the graphics, results of each model case is summarized below.

- Modelling of spent nuclear fuel pool fire at the Peach Bottom nuclear plant, located west of Philadelphia, depending upon the meteorological conditions at time of and after the fire is illustrated on three regional maps on different dates and meteorological conditions (these models were conducted by Professor Frank von Hippel and Michael Schoeppner of Princeton University; published in scientific journals). Take note of the red and orange colored geographical areas which are mandatory evacuation zones which span numerous Atlantic seaboard states, and millions of persons permanently displaced.

- Similar modelling of spent nuclear fuel fires by the same Princeton team of nuclear scientists was conducted for the Surry, Virginia nuclear power plant, located on the James River in southwest Virginia. Note that the mandatory evacuation zones include major metropolitan areas such as Washington, DC,

Baltimore, and as distant as New York and Boston, depending upon weather conditions. Population relocations can be as great at 49 million people.

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Closing Comment:

These case studies illustrate the enormous risks and consequences to humans and their cities and environment of nuclear power and spent nuclear fuel. Currently, with only minor exceptions, all USA nuclear waste is stored in SNF cooling pools or on-stie storage casks. There is no plan by the U.S. government for permanent disposal which would require security and infallible containment for hundreds of thousands of years, longer than the human race and civilization has existed on this planet.

There is no other energy system that embodies these huge and essentially forever risks and consequences to life and the environment. We simply do not need to engage in these enormous risks and consequences. We already have proven and truly safe, low to zero carbon greenhouse gas technological options that can be put into action NOW. Nuclear power is not the answer, and given the above illustrated enormous risk and consequence scenarios every nuclear power plant and its associated nuclear wastes amounts to the functional equivalent of pre-positioned nuclear disasters, exceedingly vulnerable to malicious acts.

Requested Legislative Actions:

We must not, and need not build any new nuclear power plants in the USA or Colorado. Nuclear power and its associated nuclear wastes are fundamentally flawed and exceedingly dangerous technologies.

1. **Please remove all consideration of nuclear power from HB 23-1247**
2. **Vote in opposition of HB 23-1030 in its entirety.**

Thank you.

See attached six graphic illustrations:

1. Peach Bottom nuclear power plant (southeast Pennsylvania): four seasonal radiological contamination zones from hypothetical fire in spent fuel pool.
2. Peach Bottom nuclear power plant: April 2015 fire scenario of spent nuclear fuel pool
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6. Indian Point Nuclear Power Plant, on Hudson River near New York City; Radioactive Cesium-137 releases from a modelled spent nuclear fuel fire; resulting from a aircraft attack on the spent fuel cooling pool; total effective dose equivalent (TEDE) and zone of downwind contamination/evacuation-exclusion zone.

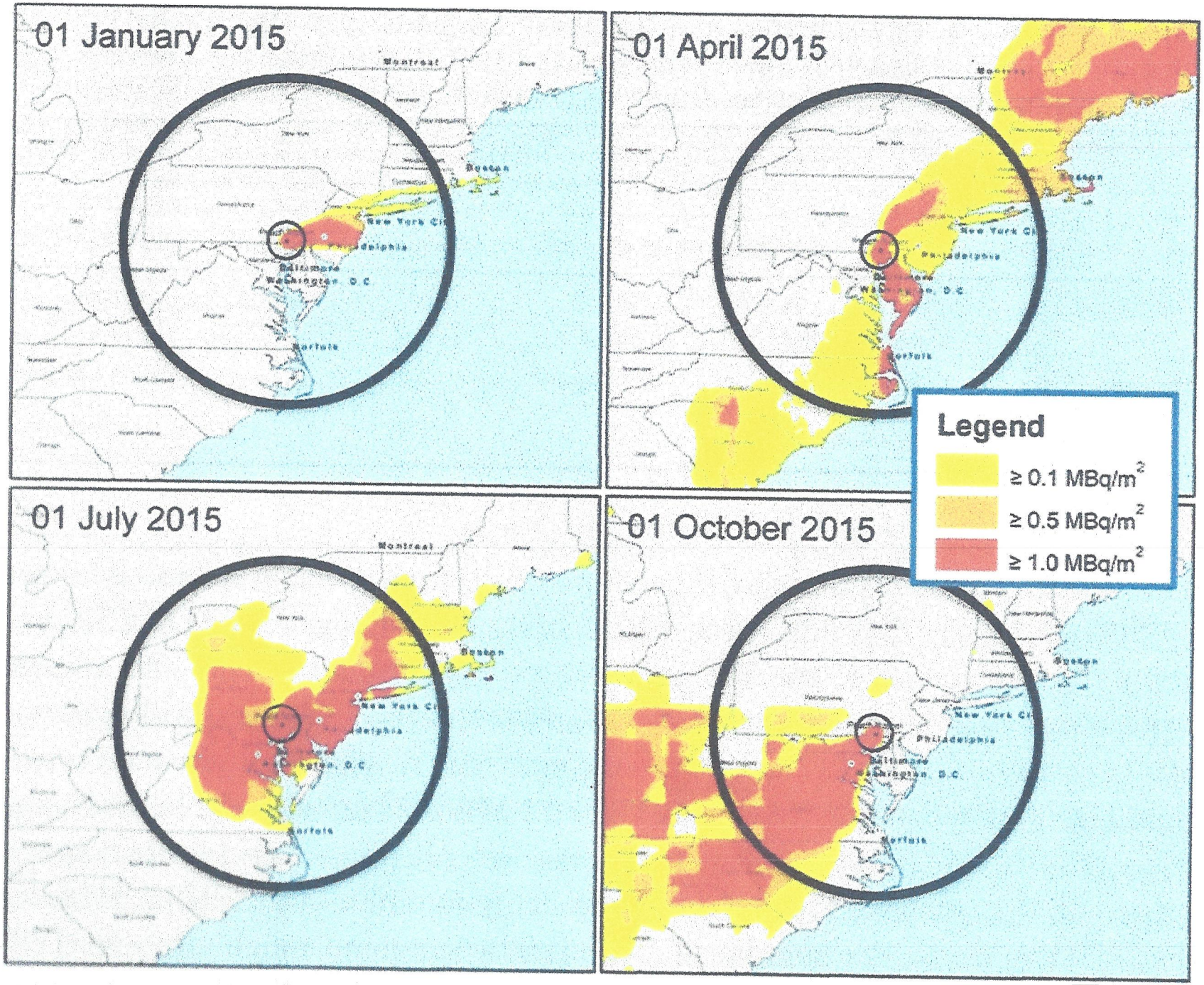

Figure 6. Contamination areas from a hypothetical fire in a high-density spent fuel pool at the Peach Bottom Nuclear Power Plant in Pennsylvania releasing 1600 PBq of cesium-137 on four dates in 2015.

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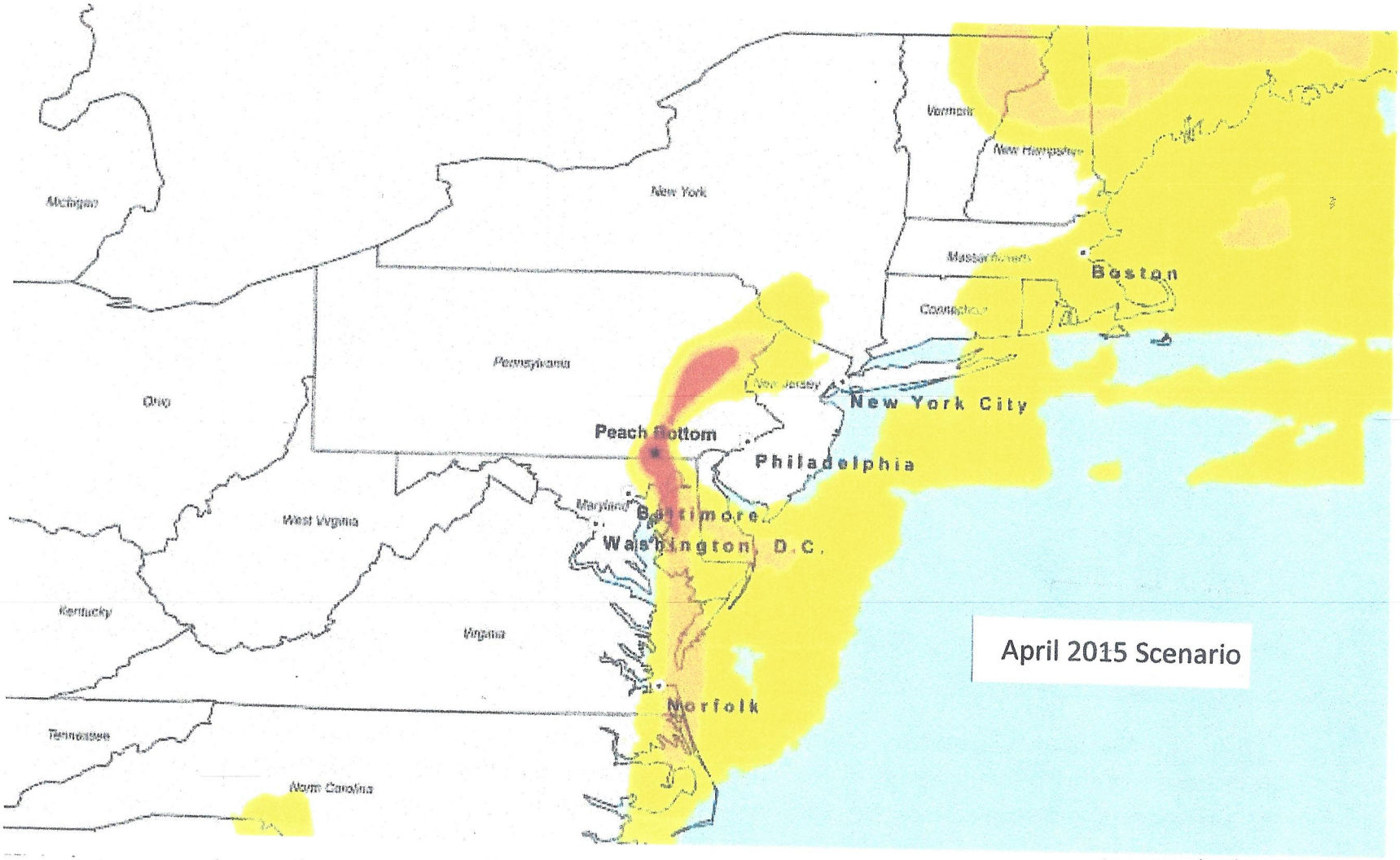

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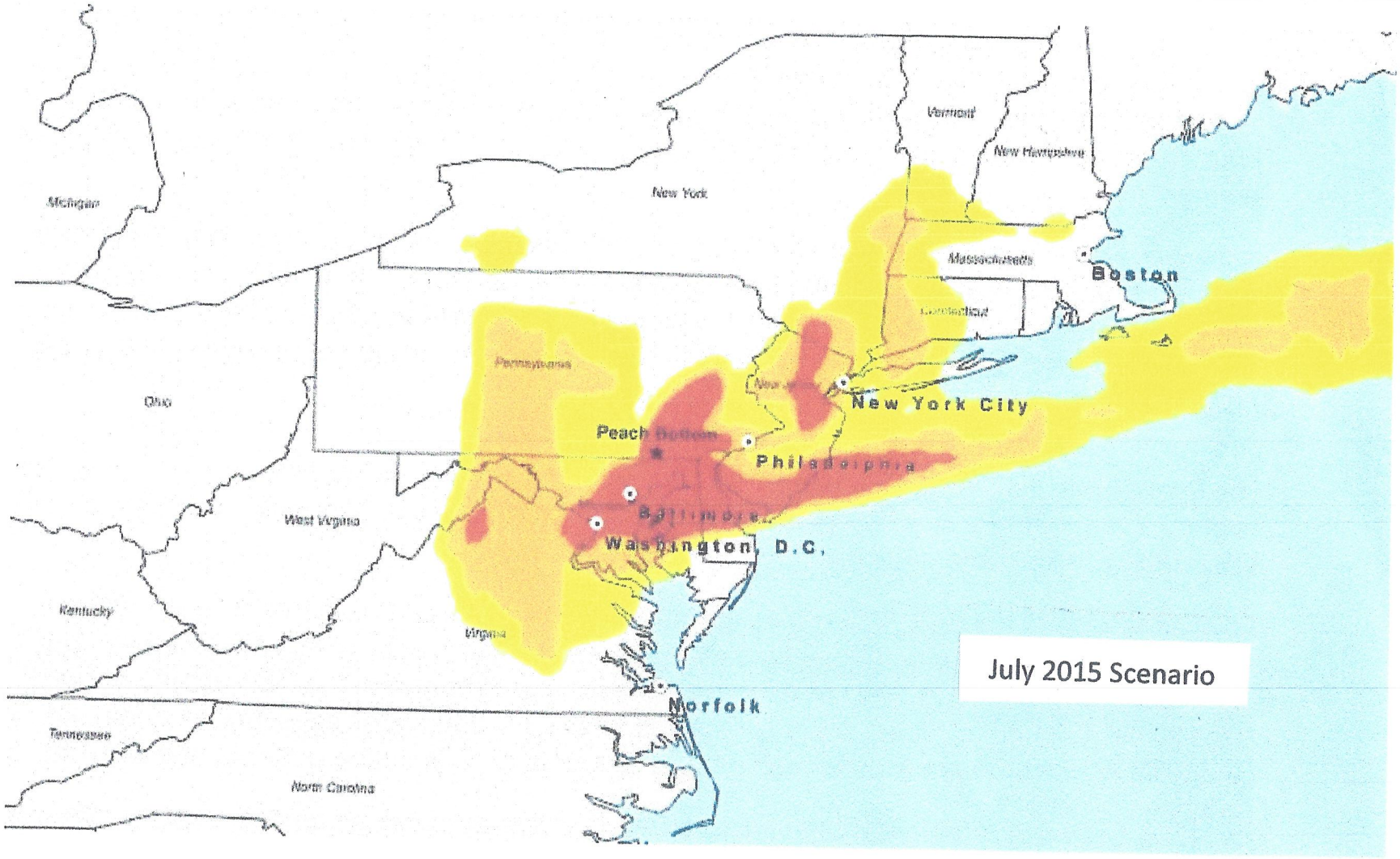

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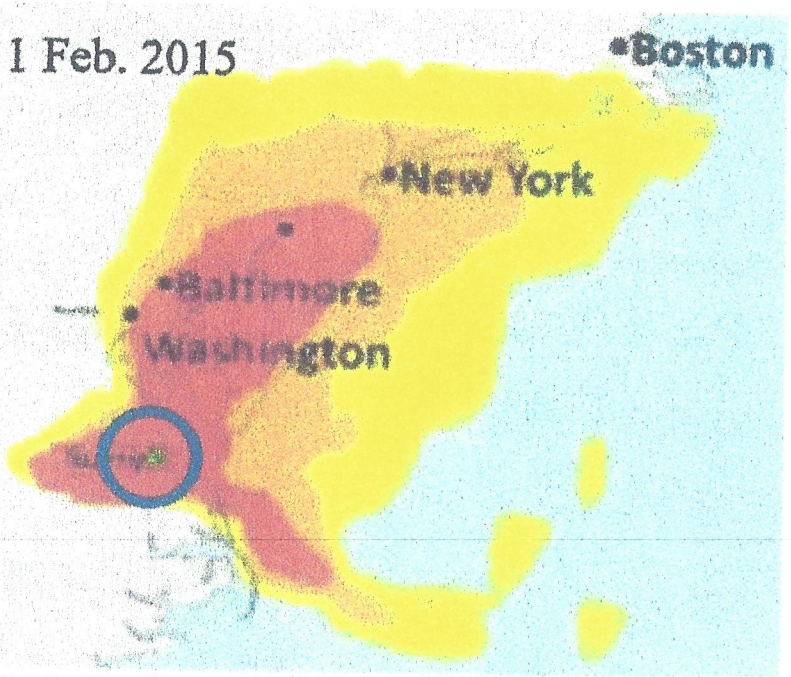
Relocation areas (orange and red) for spent fuel fire in a dense-packed pool at the Surry, VA nuclear power plant



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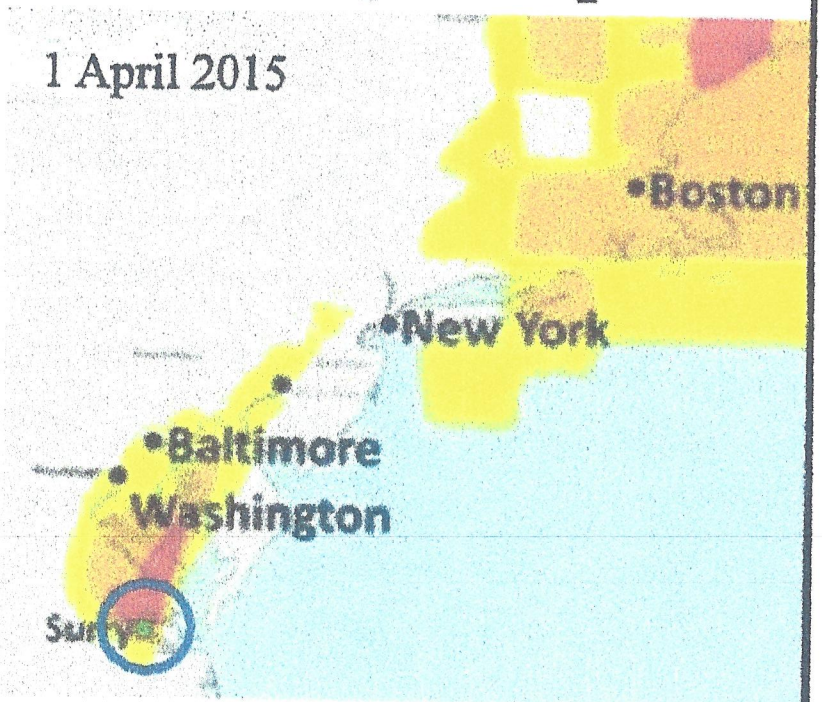

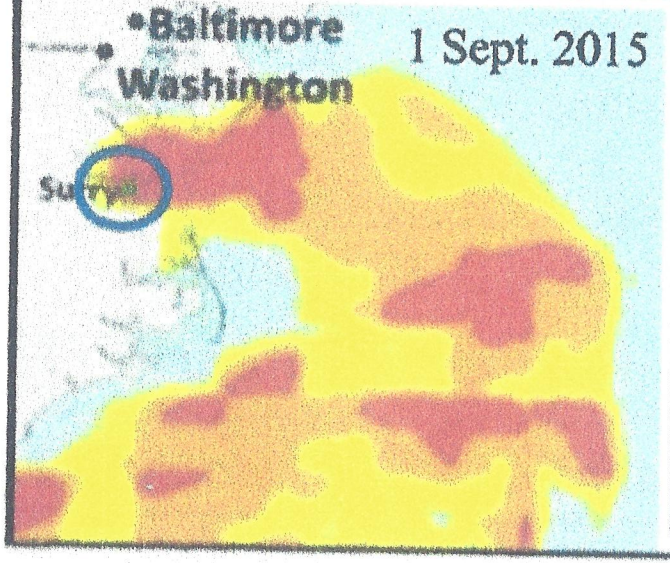

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Fukushima population relocated if ≥ 1.5 MBq/m² Cs-137 contamination (orange)

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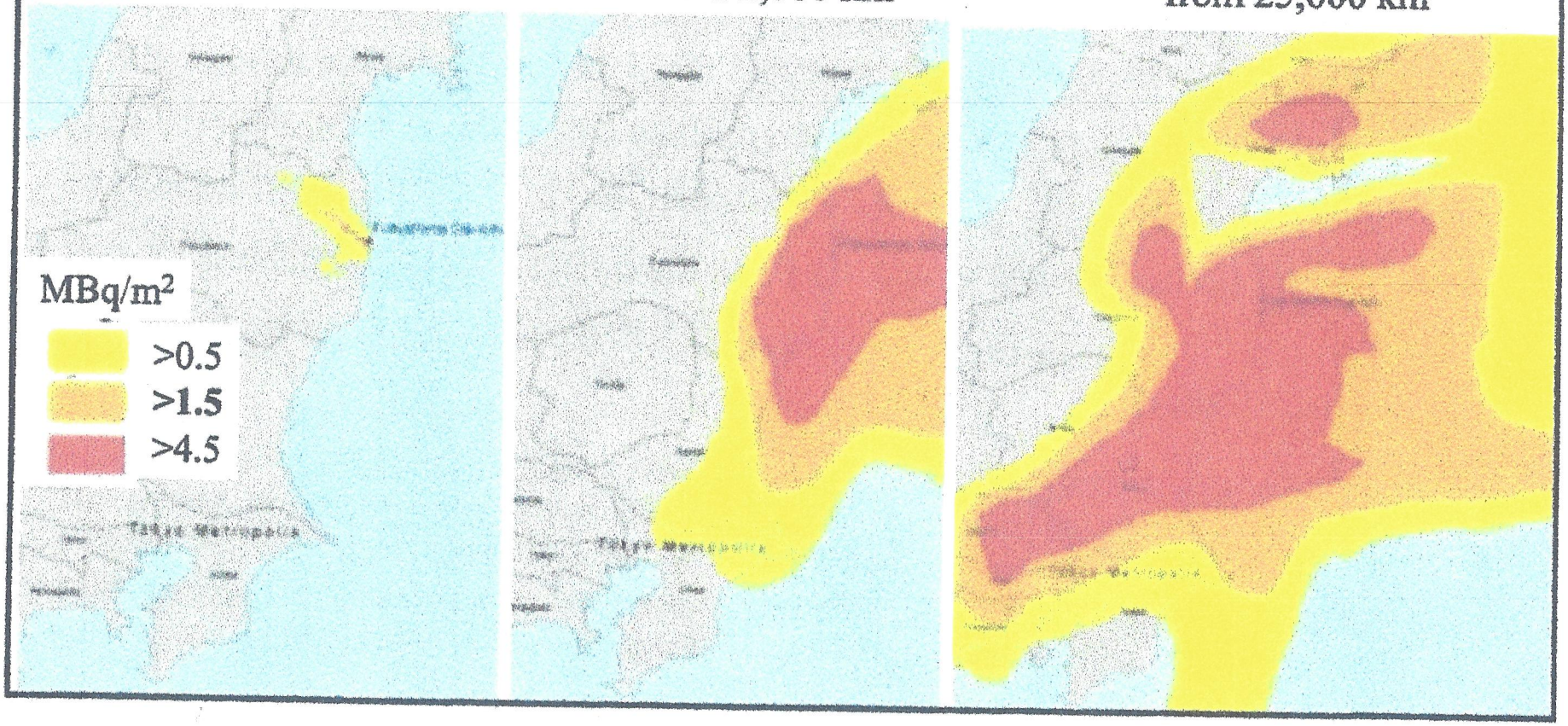

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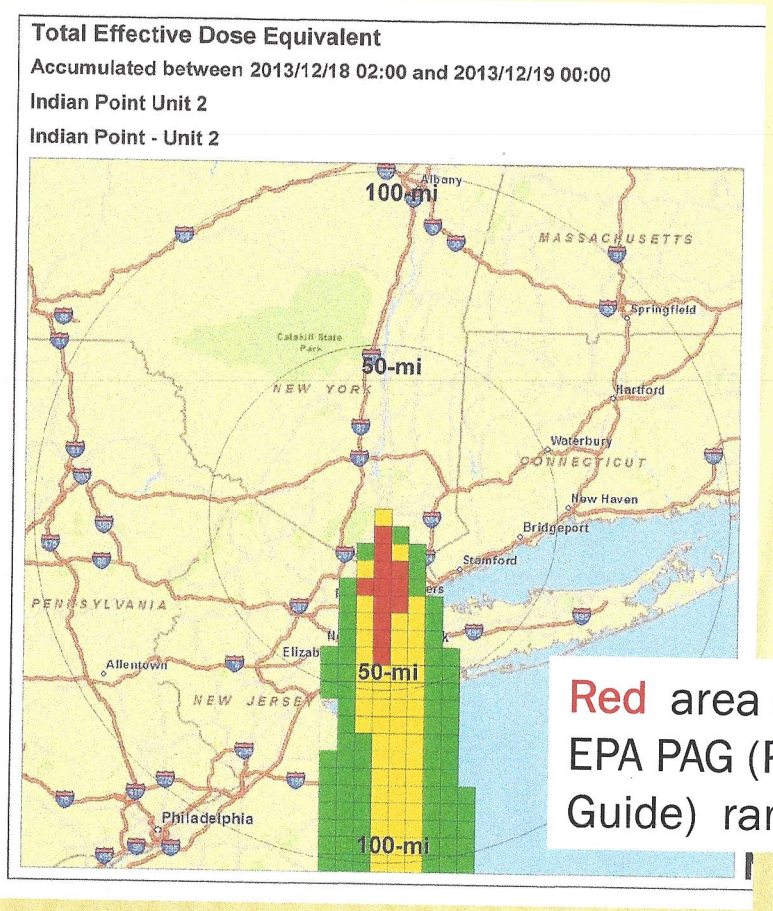

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Small circle is area of contamination assessed by NRC, 50 miles.
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Red area exceeds 100% EPA PAG (Protective Action Guide) range –evacuation

Green area: 0.05 to 0.5 rem
Yellow area: 0.5 to 5 rem
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R. D. Andrews, RASCAL 4.3 model, independent study, Jan 2012.

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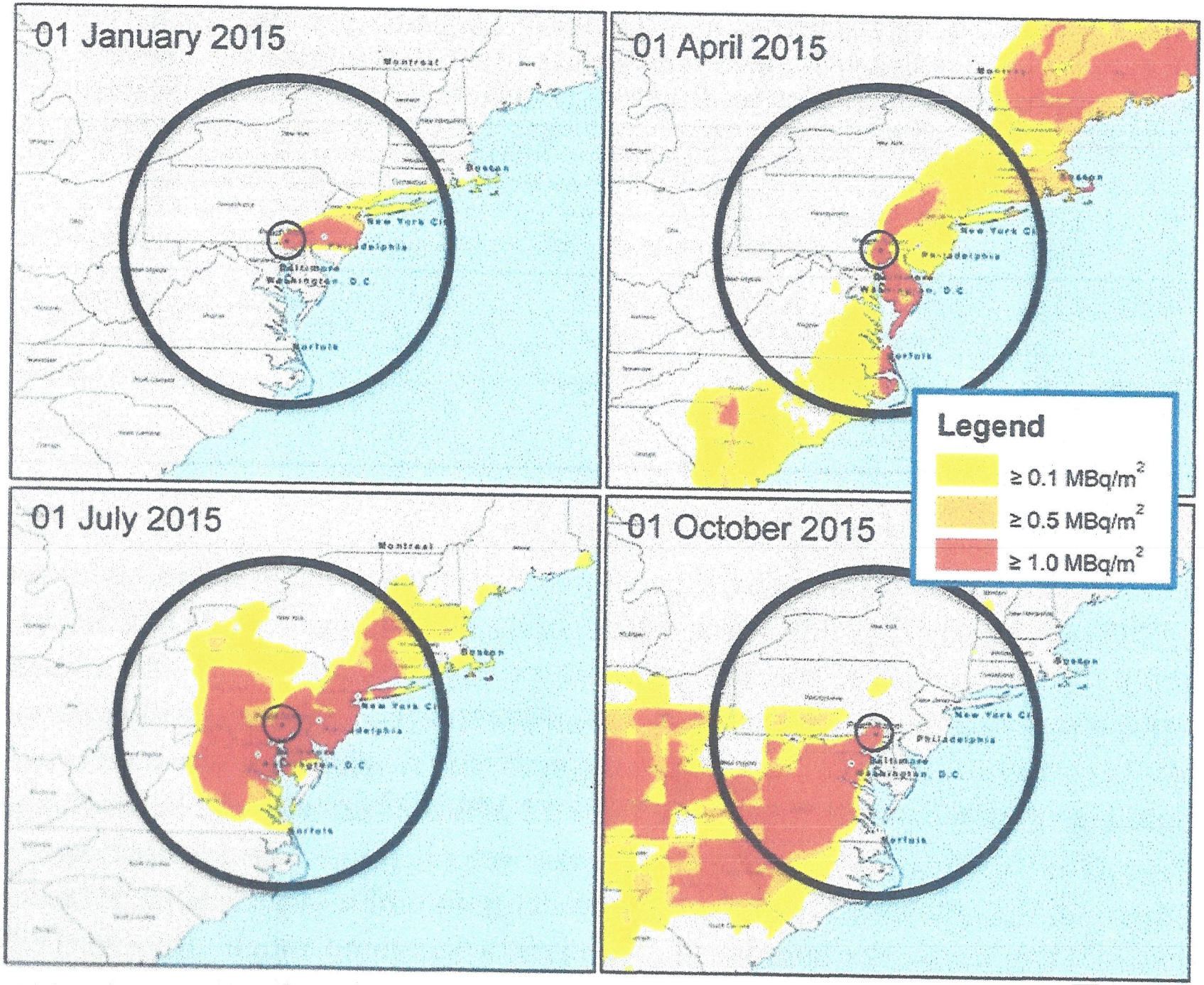

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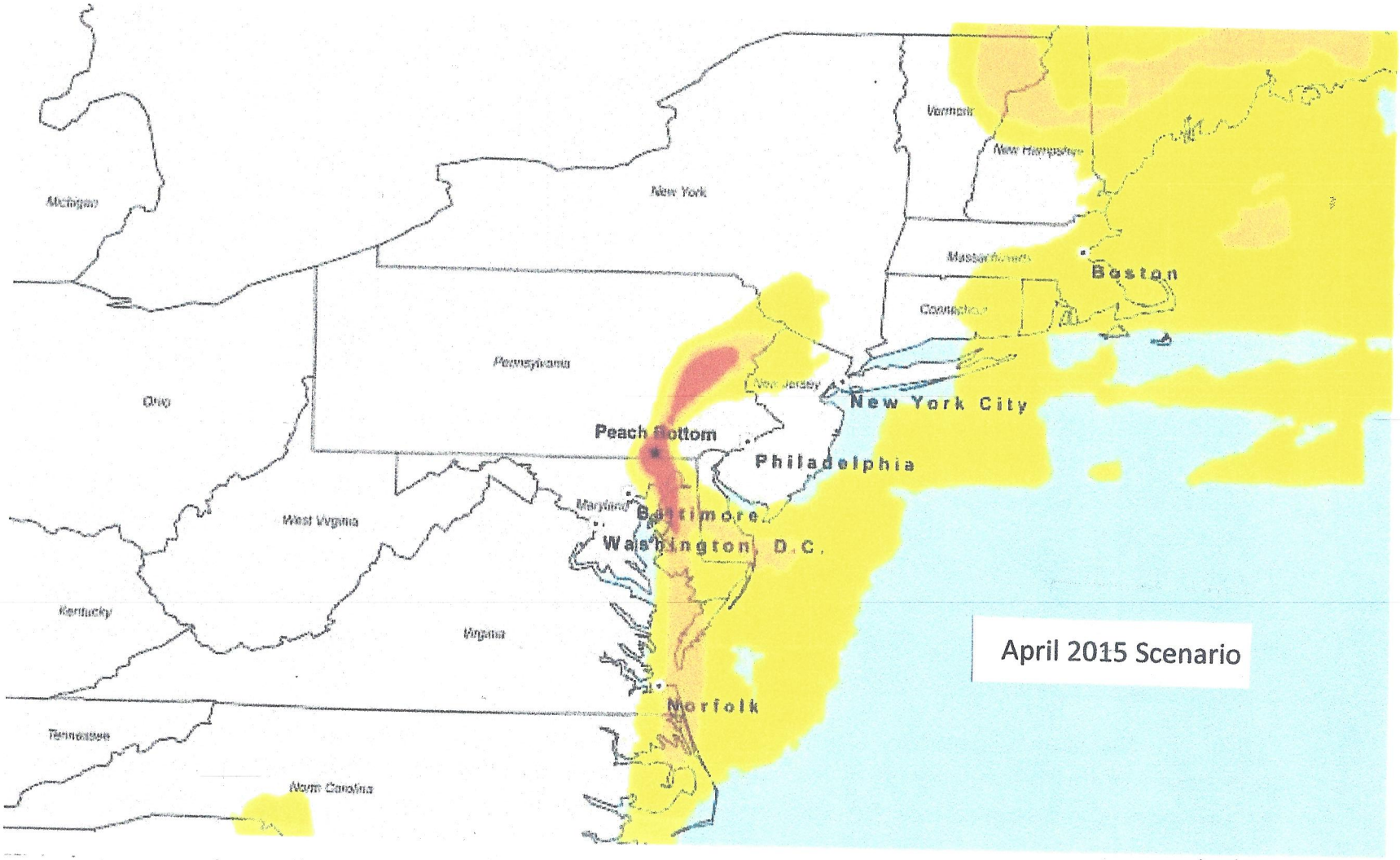

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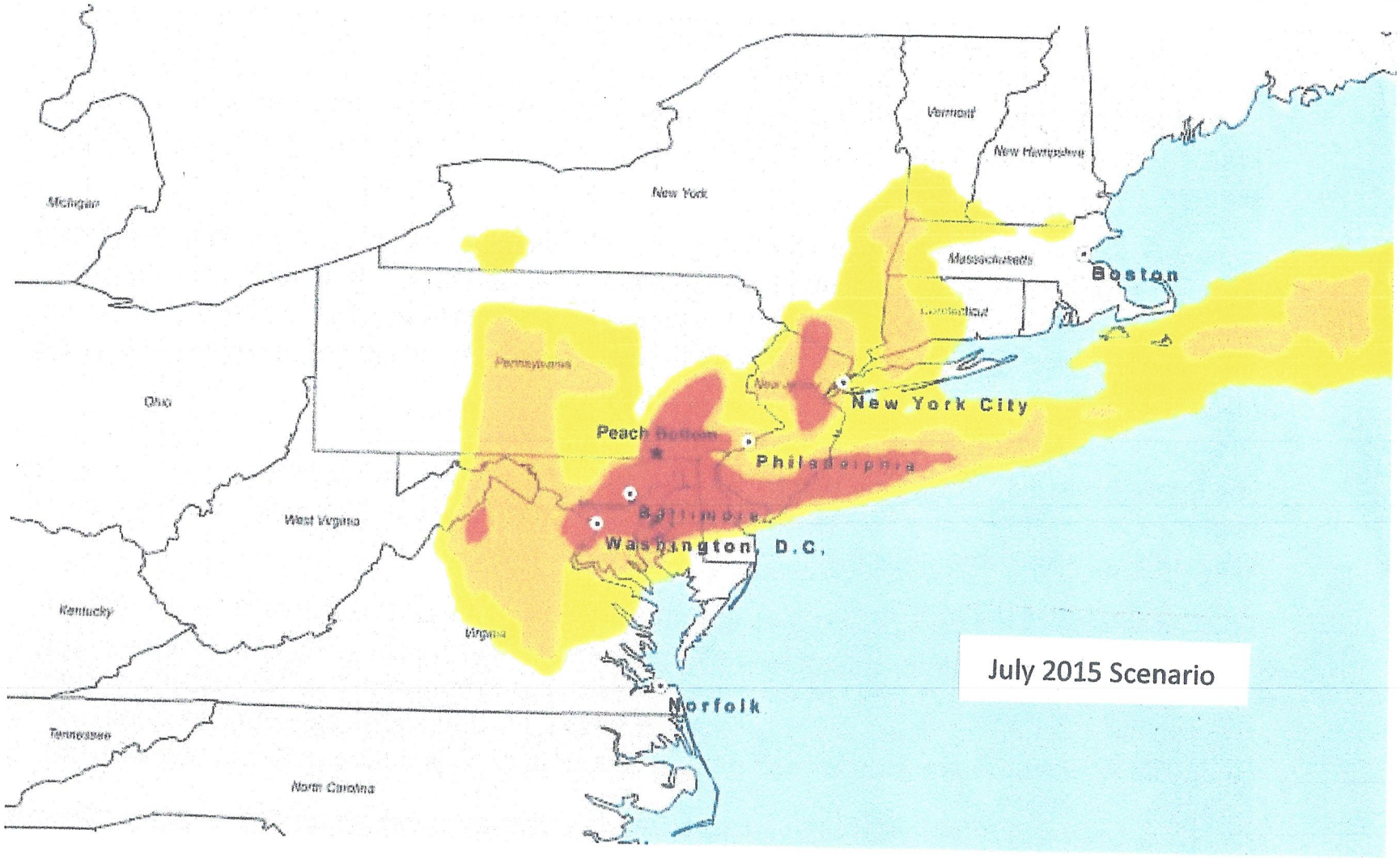

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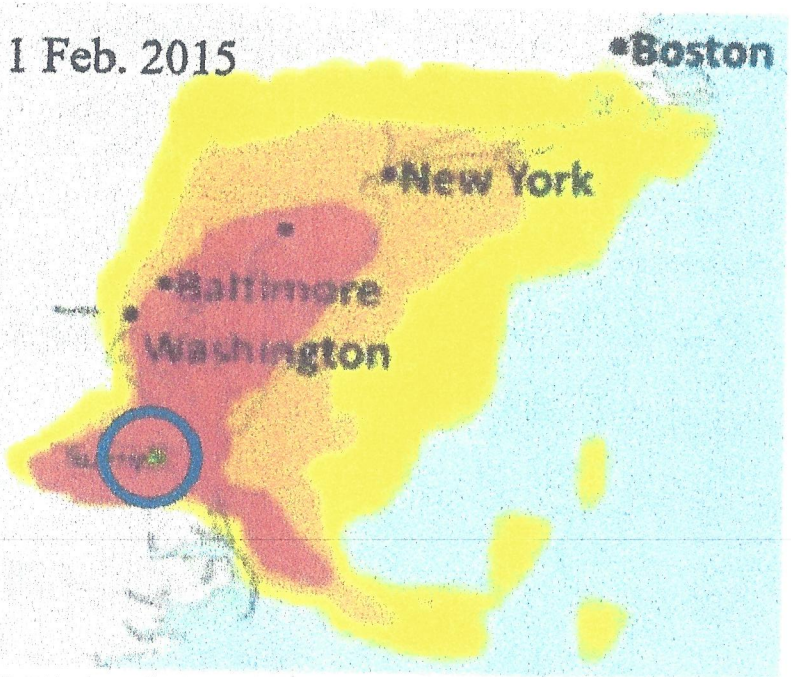

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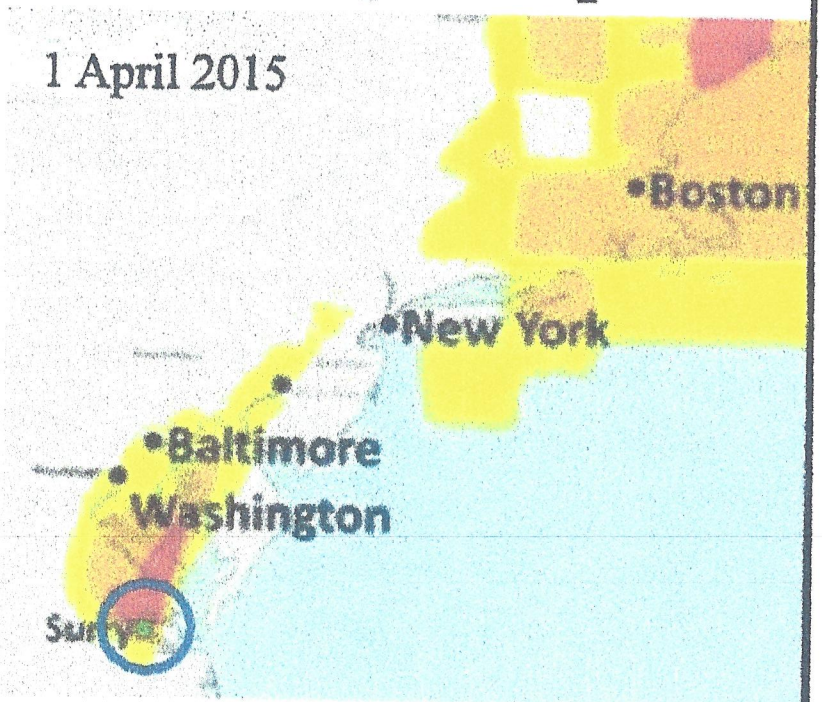

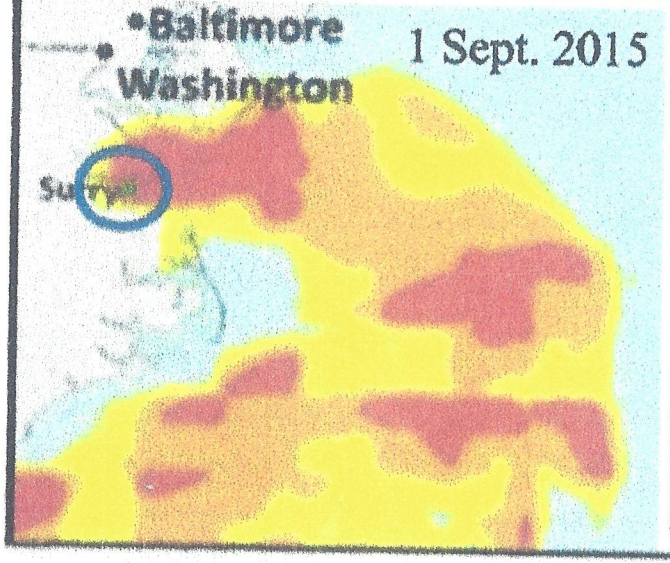

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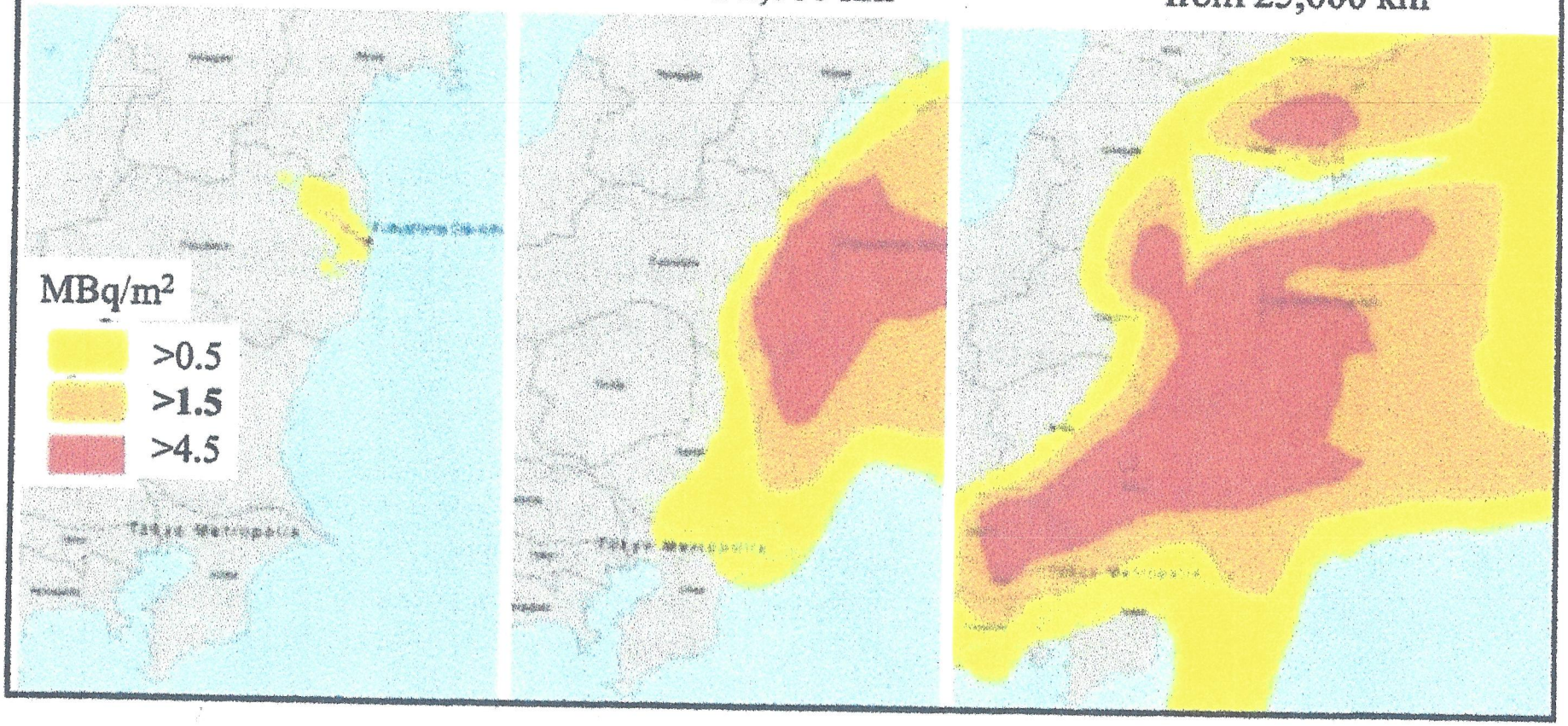

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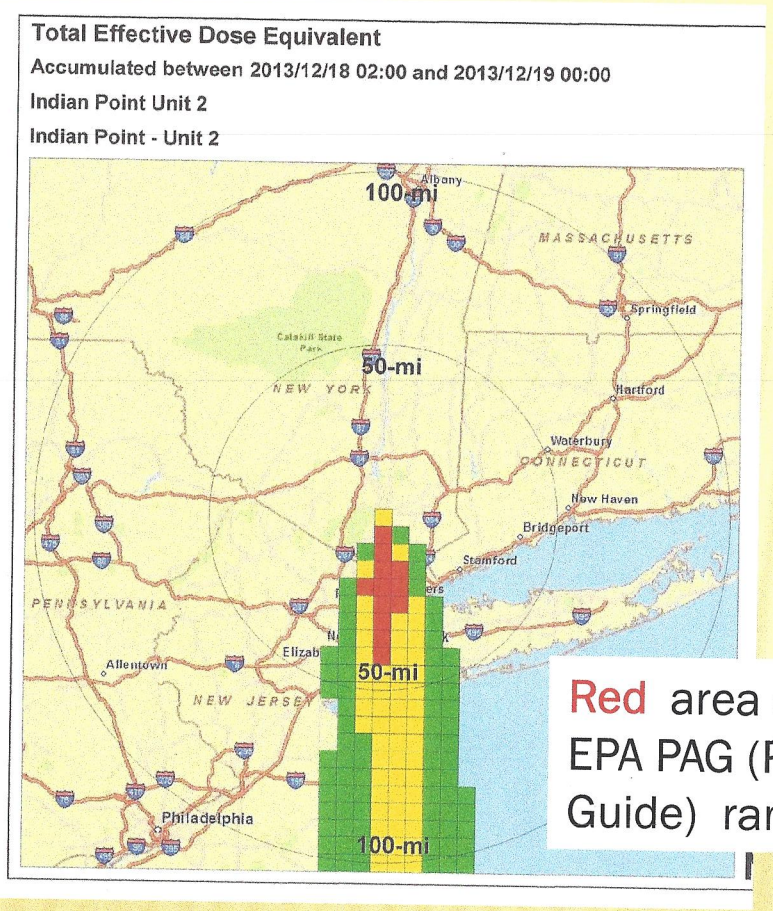

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R. D. Andrews, RASCAL 4.3 model, independent study, Jan 2012.

Written Testimony of Kathy Fackler, 365 Blue Spruce Trail, Durango, Colorado

House Energy and Environment Committee
SUPPORT - HB23-1247: Assess Advanced Energy Solutions In Rural Colorado

Thank you for the opportunity to provide written testimony to this committee.

I am a retired software engineer from Durango Colorado, a 6-year volunteer with a nonprofit, nonpartisan climate advocacy organization, and a 4-year member of Club 20. I do not speak on behalf of either organization, but my work with both groups informs my opinions on this issue. My comments here represent my own personal views.

HB23-1247 would require the state energy office to study the use of advanced energy solutions in rural Colorado as we accelerate our transition to clean energy. I strongly support that action.

Leveraging Federal Clean Energy Incentives – As a citizen lobbyist, I spent the last two years advocating for national legislation that incentivizes all the energy technologies listed in HB23-1247: geothermal, clean hydrogen, advanced nuclear, carbon capture, wind, solar, and long duration energy storage. Those bills passed with overwhelming Democratic support, and some support by Republican members of Congress.

My organization is lobbying this year on policies to maximize the climate benefits from those important investments by streamlining clean energy deployment and build-out of transmission infrastructure. We need state and local policies to meet those goals, and most of the projects will be built in rural America.

Grid Reliability – The studies outlined in HB23-1247 would consider whether firm resources are needed to optimize or stabilize a grid dominated by intermittent renewables. Like many Coloradans, I worry that a "100% renewable by 2040" electric grid may not be reliable or resilient enough for utility customers. The climate is changing at the same time our energy systems are changing, so it's best to plan for periods of extended cloud cover and low wind.

Just Transition – One study would look at ways to salvage the coal-dependent communities that have been, or soon will be, economically decimated by the policies enacted in 2019. They would look at ways to replace the tax base long provided by fossil energy, and investigate ways that Colorado's coal country could continue to produce the energy we all need using cleaner sources. Some of the federal incentives passed in the Bipartisan Infrastructure Act and Inflation Reduction Act are specifically targeted toward energy transition communities like Craig, Hayden, and Nucla. Senators Bennet and Hickenlooper fought for those provisions. Colorado should make use of them if possible.

Facing Change Together – Last month I attended Club 20's Legislative Day. Elected members of this body from both parties were generous with their time and attention. Many, including House Speaker McCluskie, talked about the importance of bridging the partisan divide and the rural divide. Here's an opportunity to do that, on a rural Colorado bill that already has bipartisan sponsors in both chambers.

HB23-1247 is a logical, necessary energy transition planning step for Colorado. This bill is about opportunity - for Colorado's energy future and for the economic future of our rural areas. It's about our responsibility to the Coloradans who have produced our electricity for half a century or more.

Thank you for serving Colorado, and for considering my comments. **I urge a YES vote on HB23-1247.**

HB23-1247 - Assess Advanced Energy Solutions In Rural Colorado

My name is David Takahashi, and I ardently support HB23-1247.

On March 20, 2023, the IPCC released its Sixth Synthesis Report, which called for urgent action to bequeath the coming generations of an inhabitable Earth. The report clarifies that a concerted effort will be required to prevent further disasters like the Marshall Fire along the suburban Wildland Urban Interface at the end of December. Urgent means starting yesterday, and concerted means all hands on deck. That the U.S. joined the allied effort late and geared up and that the Ozone hole is healing is a testament to our ability to get this done.

I lost my home to the most destructive wildfire in Colorado history in 2010. Since then, the next most destructive wildfire in Colorado history has steadily marched upon us until the Marshall Fire claimed nearly 1100 homes in the middle of our winter. I watched my community wash away in the biblical floods of 2013. I am helping victims of the Marshall Fire rebuild their ruined lives. Unfortunately, fires, floods, and droughts are all predicted to be more frequent with greater intensity the longer we delay concerted action.

I have worked at the household, neighborhood, municipal, state, and federal levels to stop burning carbon for the last thirteen years. In the early years, I would ask how many have experienced firsthand a warmed world, and no one would raise their hand. Then year after year, more hands would go up. At this point, very few hands remain in the laps. The public knows doing nothing is no longer an option. The world is getting primed to act as it has been able to. This year I see more and more bipartisan energy bills. Even better, I am seeing legislation like HB23-1247, which also begin to bridge the urban and rural divide.

Suppose you are familiar with Jack's Solar Garden in Longmont, CO. In that case, you know, a solar garden constructed along the existing transmission. Agrivoltaics features ground-mount solar, providing shade to crops beneath, not unlike a food forest where the overstory is solar panels instead of trees,

which has demonstrated the synergy available to our urban/rural interface. The over-built urban development needs land for community solar gardens, and the expansive rural holdings seek markets for their goods and services.

This legislation is sponsored by both sides of the aisle, in both houses of the General Assembly. It has attracted this sponsorship because this legislation offers something to everyone. Further, the sponsors are both urban and rural in their constituents. So again, this bill addresses the urgency to lower our dangerous emissions while benefiting our urban built environment and rural pastoral contexts.

It is promising that we begin to see such broad-based legislation. It turns out that fires and floods make no distinctions for their victims. And all of us wish to see our grandchildren smiling and appreciative of the strides we have made to protect them.

I look forward to a time when working together is considered the way it has always been done. Our passed polarized patterns are no longer serving us.

Please consider a whole-hearted yes vote on HB23-1247 so we can begin to enjoy the power that comes from working together instead of against each other.

James Hopf Testimony on HB 23-1080

I'd like to thank the committee for the opportunity to testify today, in favor of HB 23-1080. My name is Jim Hopf, and I'm a member of Generation Atomic, a grassroots organization that supports nuclear power.

There is no scientific or rational basis for excluding nuclear from Colorado's Clean (or "Renewable") energy standard. Nuclear power is a clean energy source under any objective definition. Analyses and data, based on nuclear's over 60-year operational record, show that nuclear's public health risks and climate impacts are negligible compared to those of fossil fuels, are lower than those of biomass and hydro, and are similar to those of solar and wind.[1] That includes all the impacts associated with nuclear power accidents. Nuclear power's waste is contained and has never harmed anyone.

The European Union has classified nuclear as a clean source, under their clean energy taxonomy, based on the conclusions of their formal scientific bodies. The EU Joint Research Centre concluded that nuclear does no more harm to human health or to the environment than other clean sources such as renewables.[2] Nuclear also has some advantages that other clean sources don't, such as much lower land use and mining impacts.[3]

Not only is there no scientific basis for excluding nuclear from the Clean Energy Standard, but its inclusion will be very important. There is a growing consensus among experts that it will not be practical or affordable to get all our power from intermittent sources. Analyses show that inclusion of non-intermittent sources like nuclear will significantly reduce the overall cost of a carbon-free grid, by greatly reducing the amount of electricity storage that will be required.[4] At high penetration levels of intermittent sources, the overall cost is dominated by the cost of storage, which would be required at an extreme scale. Largely for the above reasons, most IPCC pathways that meet the 1.5 degree warming goal require nuclear power generation to increase by a factor of three[5] to six[6] by 2050. In short, meeting our climate goals will be very difficult without nuclear power.

Nuclear power is not, and need not be, a partisan issue. There is widespread bipartisan political support in the US for new nuclear power plants. One example being the Democratic Biden administration, which very strongly supports nuclear. Also, many nuclear-supportive bills have passed in recent years, with support from legislators from both parties.

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[1] https://ourworldindata.org/safest-sources-of-energy#:~:text=Wind%3A%20In%20an%20average%20year,50%20years%20would%20someone%20die.

[2] https://snetp.eu/2021/04/07/jrc-concludes-nuclear-does-not-cause-significant-harm/

[3] https://www.energy.gov/ne/articles/3-reasons-why-nuclear-clean-and-sustainable

[4] https://www.sciencedirect.com/science/article/pii/S2542435118303866

[5] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.oecd-nea.org/upload/docs/application/pdf/2021-10/nuclear_energy_and_climate_change_-_cop26_flyer.pdf

[6] https://unece.org/climate-change/press/international-climate-objectives-will-not-be-met-if-nuclear-power-excluded