***Center for Health, Environment & Justice ***
***Citizens' Environmental Coalition ***
*** Coalition on West Valley Nuclear Wastes ***
***Nuclear Information & Resource Service**
***Sierra Club Niagara Group ***

March 4, 2013

Lee Gordon, NYSERDA
Moira Maloney, DOE
Official Phase 1 correspondence representatives
US DOE
NYSERDA
Ashford Office Complex
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Sent via email

Re: Climate Guidance for Phase 1 Studies, November 2012

Dear Lee Gordon and Moira Maloney,

This Climate Guidance document was prepared by Enviro Compliance Solutions, Inc. for US Dept. of Energy and NY Energy Research and Development Authority. Following a Climate workshop in August 2012 where four scientists made presentations to the Agencies and public attendees. At the workshop we attempted to understand and to obtain detailed answers as to how climate change would be addressed after the workshop in order to engage in a discussion. Instead we were told at the close of the workshop that a Climate Guidance would be prepared by the Agencies.

Our Key Question: What is the purpose for this document? The West Valley site was an extremely poor choice for handling any hazardous materials, much less dangerous and long lived radioactivity, because the site is vulnerable to erosion. The impact of climate change on erosion and the potential for loss of containment of the radioactive inventories should be the basic reason for the consideration of Climate change in this document. Erosion vulnerability coupled with climate change will make it impossible to contain radioactive inventories over the long term (such as in a long term stewardship scenario). However, no similar statement appears anywhere in this document. A simple statement of basic facts should have appeared in the beginning of this document.

Two Foundation Questions

Instead the document gives primacy to two foundation questions: 1) What are the climate change issues that should be considered in WVDP Phase 1 Studies (i.e. soil erosion, engineered barriers, in-place closure) ? 2) How might climate change issues be evaluated during Phase 2 Decision-making for the decommissioning or long term stewardship for the WDVP?

These questions immediately create a problem. Phase I Studies are supposed to be used to help make decisions about the major site facilities containing buried radioactive materials. Studies and their evaluations should be occurring in Phase I. Phase 2 will involve activities to address the high level waste tanks and the two burial areas- the NDA and SDA. This second foundation question has created three phases – Phase I, Phase 2 Decision-making and Phase 2 decommissioning or long term stewardship. Why have the Agencies created three phases? While it is obvious that a ten year Phase I is no longer possible, the adoption of a three phase approach would have to be presented to the public and discussed. At this time it is still our understanding that all of the needed studies in order to make decisions about Phase 2 facilities will be completed in Phase I.

Climate Guidance or Not?

The title of this document is "Climate Guidance for Phase I studies", implying that this document might be intended for use by the various subject matter teams. So far none of the SME teams are focused on climate change, however, a key influence on their analysis will be the impacts of climate change on their subject area. If that is the case, where is the Actual Guidance that the SME teams should use? We do not find guidance in this document. The other teams are not climate experts, therefore all of the teams should be operating under a similar understanding of climate factors. Following B. Warren's criticism of the lack of guidance in this document at the previous quarterly meeting, Dan Herlihy of ECS consultants explained that the guidance is intended to allow the expert teams to select from a variety of factors (rainfall, etc.) that each team feels are appropriate. However, it should be obvious that this requires that each expert team have climate expertise and they don't. Scientists were chosen for the teams because of their expertise in their own field.

Where is the Science?

Here we discuss four issues: what the experts said, what the draft National Climate Assessment says, West Valley factual information, and the missing facts & unscientific choices appearing in the guidance.

1. What the experts said- Climate experts were hired for the Aug. 2nd Climate change workshop, however for some reasons none of their statements managed to make it into this Guidance document. The scientists made quite a few strong statements, that included the fact that we were already experiencing the impacts of climate change. Many of the points made by the

four climate experts also appeared in the recently released Draft National Climate Assessment. Rather than repeat such items twice we have used them once, and they are included in the citations of the National Assessment.

We have had 10-15" increase in precipitation since the first part of the century. The ten highest precipitation events were all recent occurrences. The 100 year, 4.65 inch rainfall, will now occur every 66 years.

Probable maximum precipitation was discussed:

Probable Maximum Precipitation (PMP) values

6 hr.- 24 inches

12 hr.- 28 inches

24 hr.- 30 inches

48 hr. -33 inches

72 hr.- 34 inches

Only one PMP value appears in the Climate Guidance in Table I for a 24 hr. storm, with a lower value- 24.7 inches, than was provided above by the climate scientists. However, it was noted by a climate scientist, that in a situation, such as West Valley where failure is unacceptable, the probable maximum flood should be used for evaluating site impacts (rather than probable maximum precipitation). There was no discussion of probable maximum flood in this Climate Guidance.

2. Chapter 2 Draft National Climate Assessment (US Global Change Research Program)
http://www.globalchange.gov/what-we-do/assessment

We have primarily copied the most important statements into this document citing Chapter 2 and Chapter 16, for the Northeast.

Warmer air holds more water vapor than cooler air. Water vapor in the atmosphere has increased over land and oceans.

US precipitation has increased overall by 5%, but the NE increase has been 8%.

More winter and spring precipitation is projected for the northern U.S., and less for the Southwest, over this century.

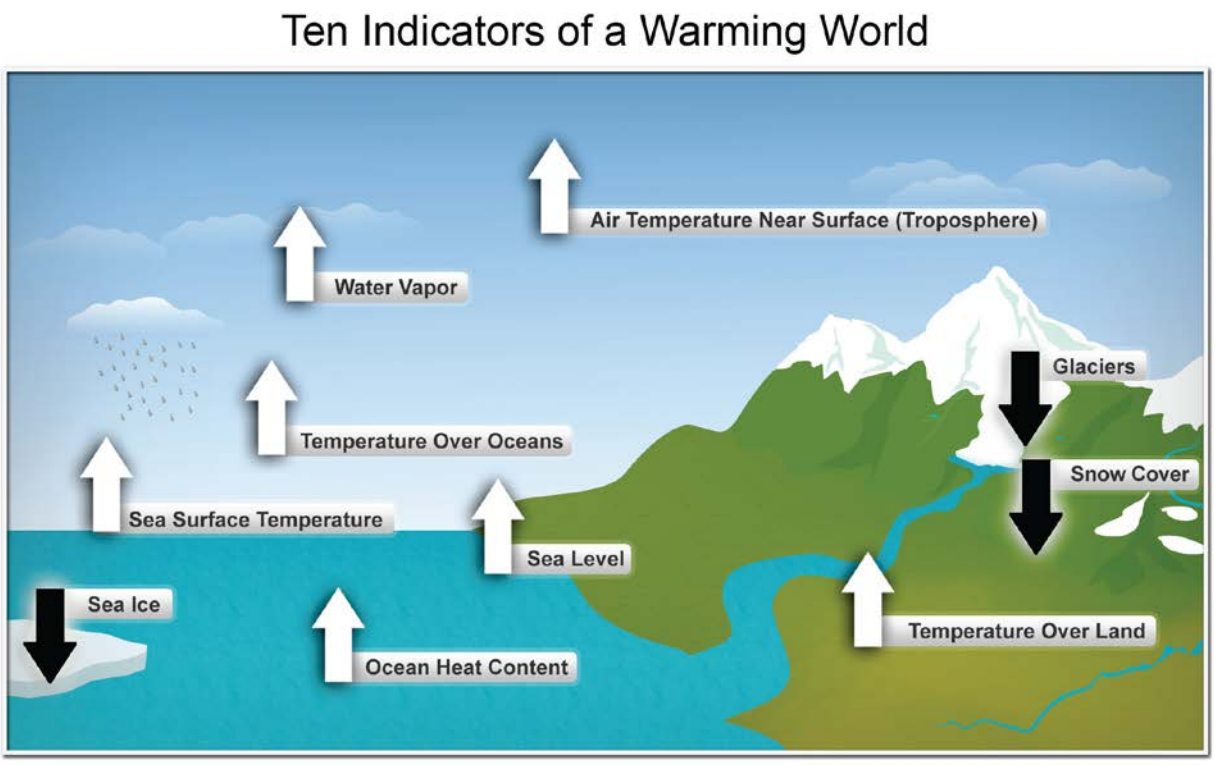

Figure 2.1: Ten Indicators of a Warming World
Caption: These are just some of the many indicators that have been measured globally over many decades and that show that Earth's climate is warming. White arrows indicate increasing trends, black arrows indicate decreasing trends. All the indicators expected to increase in a warming world are increasing, and all those expected to decrease in a warming world are decreasing. (Figure source: NOAA NCDC)

Heavy downpours are increasing in most regions of the U.S., especially over the last three to five decades. Largest increases are in the Midwest and Northeast. Further increases in the frequency and intensity of extreme precipitation events are projected for most U.S. areas.

Certain types of extreme weather events have become more frequent and intense, including heat waves, floods, and droughts in some regions. The increased intensity of heat waves has been most prevalent in the western parts of the country, while the intensity of flooding events has been more prevalent over the eastern parts. Droughts in the Southwest and heat waves everywhere are projected to become more intense in the future.

Projections of future climate over the U.S. suggest that the recent trend towards a greater percentage of precipitation falling in heavy rain events will continue. In regions of increasing precipitation, such as the northern U.S., increasingly large percentages of the total precipitation will come from heavy downpours. In these areas, heavy-precipitation events that are presently rare will become more common in the future.

There has been an increase in the overall strength of hurricanes and in the number of strong (Category 4 and 5) hurricanes in the North Atlantic since the early 1980s. The intensity of the strongest hurricanes is projected to continue to increase as the oceans continue to warm; ocean cycles will also affect the amount of warming at any given time. With regard to other types of storms that affect the U.S., winter storms have increased slightly in frequency and intensity, and their tracks have shifted northward over the U.S.

Other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain and are being studied intensively.

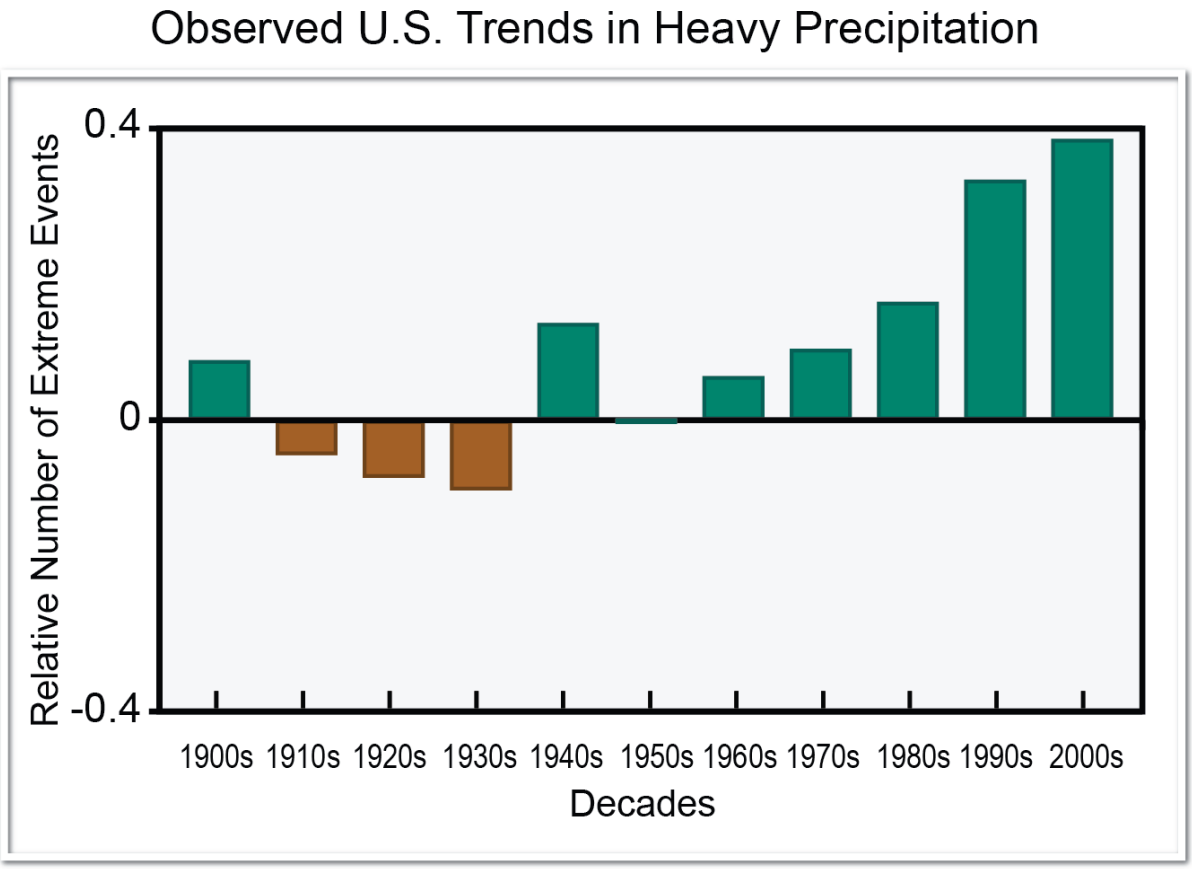

Figure 2.14: Observed U.S. Trends in Heavy Precipitation
Caption: One measure of a heavy-precipitation event is a 2-day precipitation total that is exceeded on average only once in a five year period, also known as the once-in-five-year event. As this extreme precipitation index for 1901-2011 shows, the occurrence of such events has become much more common in recent decades. Changes are compared to the period 1901-1960 and do not include Alaska or 7 Hawaii. The 2000s decade (far right bar) includes 2001-2011. (Figure source: 8 adapted from (Kunkel et al. 2012) (**Note: Dr. Kunkel was one of our panel of experts and he is heavily cited in this national assessment BW.)**

Heavy Downpours Increasing

Heavy downpours are increasing in most regions of the U.S., especially over the last three to five decades. Largest increases are in the Midwest and Northeast. Further increases in the frequency and intensity of extreme precipitation events are projected for most U.S. areas.

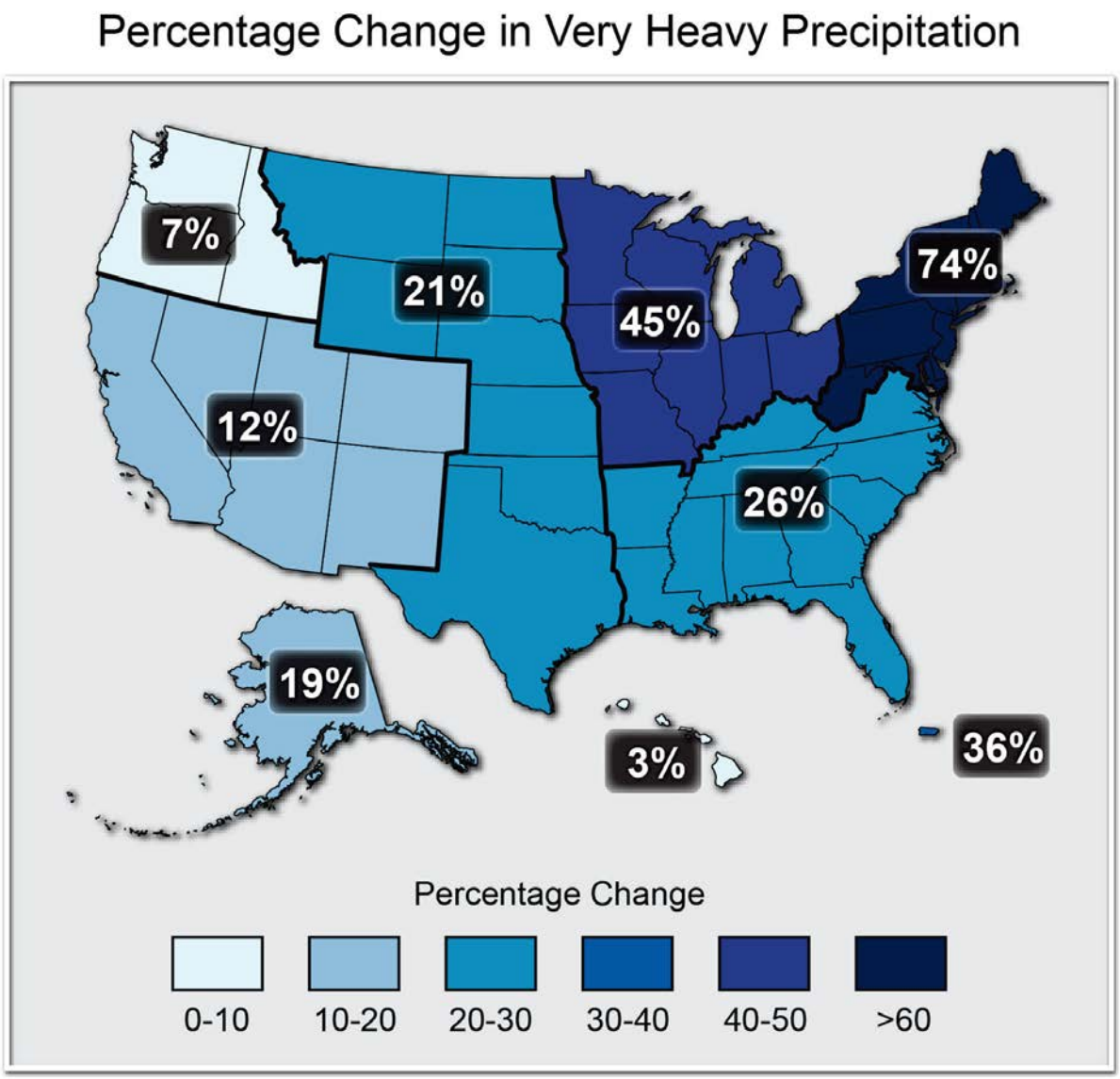

Figure 2.16: Percentage Change in Very Heavy Precipitation (defined as the heaviest 1% of all daily events)

Caption: The map shows percent increases in the amount of precipitation falling in *very heavy* events from 1958 to 4 2011 for each region. There are clear trends toward a greater amount of *very heavy* precipitation for the nation as a whole, and particularly in the Northeast and Midwest. (Figure source: updated from (Karl et al. 2009) with data from NCDC)

The Northeast has experienced a greater increase in extreme precipitation over the past few decades than any other region in the U.S.; between 1958 and 2010, the Northeast saw a 74% percent increase in the amount of precipitation falling in very heavy events. (Chapter 16)

Rare Heavy Precipitation events (now occurring once every 20 years) are predicted to increase in the Northeast in the future by 3-4 times.

There has also been an increase in flooding events in the Midwest and Northeast where the largest increases in heavy rain amounts have occurred.

In the mid-latitudes, where most of the continental U.S. is located, there is an upward trend in extreme precipitation in the vicinity of fronts associated with mid- latitude storms (Kunkel et al. 2012h).

Hurricanes
There has been a substantial increase in virtually every measure of hurricane activity in the Atlantic since the 1970s.

Chapter 16 The Northeast

The Northeast is often affected by extreme events such as ice storms, floods, droughts, heat waves, hurricanes, and nor'easters.

Hurricanes such as Irene and Sandy provided a "teachable moment" by demonstrating the region's vulnerability to extreme weather events and the efficacy of existing and evolving adaptation/response plans.

Two recent events contrast existing vulnerability to extreme events: Hurricane Irene, which produced a broad swath of very heavy rain (greater than 5 inches in total and sometimes 2 to 3 inches per hour in some locations) from southern Maryland to northern Vermont from August 27 to 29, 2011; and Hurricane Sandy which caused massive coastal damage from storm surge and flooding.

The rainfall associated with Irene exceeded the estimated 1-in-500-year storm at Delanson, NY and Waterbury, VT. These heavy rains were part of a broader pattern of wet weather preceding the storm that exacerbated the flooding associated with Irene; rainfall totals for August and September exceeded 25 inches across much of the Northeast.

In anticipation of Irene, the New York City mass transit system was shut down, and 2.3 million coastal residents in Delaware, New Jersey, and New York faced mandatory evacuations. But it was the inland impacts, especially in upstate New York and in central and southern Vermont, that were most severe. Flash flooding washed out roads and bridges, undermined railroads, brought down trees and power lines, flooded homes and businesses, and damaged floodplain

forests. In Vermont, over 500 miles of state-owned roadways and approximately 200 bridges were damaged, with estimated rebuilding costs of $175-250 million.

Hazardous wastes were released in a number of areas, (emphasis ours) and 17 municipal wastewater treatment plants were breached by the floodwaters. Agricultural losses included damage to barn structures and flooded fields of 18 crops. Infrastructure impacts from river flooding led to many towns and villages being isolated for many days (Horton et al. 2012).

Stressed Infrastructure

Infrastructure will be increasingly compromised by climate-related hazards, including sea level rise and coastal flooding, and intense precipitation events.

Monetary damages from Irene were estimated at $15 Billion. Estimates for Hurricane Sandy are in the $60-80 Billion range.

*******End of Information from Draft National Climate Assessment**********

The West Valley facility is comprised of infrastructure that is holding radioactive waste, although none of it meets current standards, even for ordinary landfills. The two disposal areas are unlined and the waste tanks are at the end of their useful lives. However it is the breaching or failure of these facilities that is the most severe consequence of increasingly severe storm events, especially those involving rainfall. The Center for Health and Environmental Justice addressed the threats that climate change and its attendant severe weather events have had on superfund sites around the nation in a 2009 report, *Superfund: In the Eye of the Storm.* Unfortunately few government reports have specifically addressed such hazardous vulnerabilities.

3. West Valley Factual Information

We know for a fact that the West Valley site is extremely vulnerable to erosion based on the type of soils present, the steep slopes, and the numerous water courses present.

We also know that based on findings of the climate experts, state, national and international scientific reports that there is a great deal of certainty about the likely direction and magnitude of climate change effects on the intensity of storms and extreme precipitation events. In fact the models have been proven very accurate in their predictions except for the fact that a number of global impacts appear to be occurring more rapidly than predicted by the models. Some of this is due to more warming occurring at the poles.

We also have very detailed factual information about the erosion impacts of a severe storm that occurred in August 10, 2009. We had an enormous landslide and lost 15 feet at the top of the bank for Buttermilk Creek. We also had significant movement of two knickpoints near - Erdman Brook and Frank's Creek.

An extensive erosion control project was constructed at Erdman Brook. The damage and the costs of this work are known to the Agencies. What is not known for this storm, which involved several days of rain and heavily saturated ground, prior to an extreme rainfall event, is the exact amount of rain that fell at the West Valley site. The reason for not knowing is that there was a power failure at the time and no one thought to manually put a measuring device outside as a substitute.

However, this is what the Agencies do know --

- There was documentation of 5 inches of rain falling at nearby stations in 1 hour(a 100 yr. event in a 24 hr. period).
- There was severe flooding in the area causing extensive damage in the region
- There should be a record of the exact amount of rain that occurred immediately prior to the loss of power, as well as the preceding days of rain.
- Detailed knowledge of the erosion damage at the site.
- USGS flood gauge showed flood level reached 13.47 feet at Gowanda

It is also significant that this rainfall was not associated with a hurricane. In 1972 Hurricane Agnes came through the area causing extensive flooding. The USGS flood gauge reached 12.17 feet at Gowanda. The time between these two floods was 27 years.

Actual real world information is always better than guesstimates used as input to various models.

We believe these extreme events and other real events at West Valley and the region should be extensively mined for additional data.

- Obtain the record of floods for the last century in the area
- Examine extreme storm events in Western NY, if extreme events occurred over several days use that time period for total precipitation, as well as hourly info.
- Review West Valley records utilized by NFS for reprocessing, early site maps etc.
- Where possible document erosion damage for other severe storms at West Valley and elsewhere in the region.
- Examine the impacts of the 500 year storm at Delanson, NY to see if there is any applicability to West Valley conditions.

4. Missing Facts and Unscientific Choices (Here we are discussing the Climate Guidance prepared by ECS.)

A general comment here is that the Climate guidance is not recommending conservative assumptions for estimating climate change impacts. Conservative assumptions are the typical scientific standard for estimating or predicting environmental or health impacts.

Another general comment is that this document is a very tough read. Rather than separate out a discussion of what was done for the FEIS, this information is mixed in with what is theoretically planned for the future. The science is difficult enough for the public without having a very confusing presentation of the information. In section 3.0& 3.1 the document is talking about the future, while in 3.2 and subsequent sections there is mixing of the past with the future recommendations.

Under Section 3.0 of the climate guidance 4 bulleted items appear. In general there is nothing inherently wrong with these items. (p. 6) However, they are very general. It is in the subsequent discussion where the details are discussed and we find problems. The "devil is always in the details."

We strongly disagree with the statement on p. 6 supposedly expressed by the Climate scientists.

> "Climate Scientists emphasized that there are no simple methods for predicting future changes in rainfall depth, rainfall intensity, and storm occurrence. <u>There is considerable uncertainty in estimating future climate conditions for the Northeastern United States and elsewhere across the globe</u>."

We do not believe the scientists ever said anything remotely resembling the <u>second sentence</u> of this statement. It has either not been recorded accurately or misstated from what was actually expressed.

We believe they expressed a great deal of certainty about an increase in the intensity and frequency of heavy precipitation events over this century. This certainty does not apply to every possible weather event-- tornados, winds associated with thunderstorms, and hail.

It is true that the scientists indicated uncertainty and even the impossibility of predictions over the long term, such as 1000 or 10,000 years. However, that information was left out of the second sentence. The radioactive materials interred at West Valley will be dangerous for more than a hundred thousand years.

Heavy Rainfall events

The Northeast has experienced a greater increase in extreme precipitation over the past few decades than any other region in the U.S.; between 1958 and 2010, the Northeast saw a 74% percent increase in the amount of precipitation falling in very heavy events. (Draft National Climate Assessment.)

Given the detailed information about the dramatic percentage increase in rainfall falling in very heavy events, we question the use of hourly average precipitation to evaluate the effects of climate change on erosion at West Valley. The assumption is apparently that merely doubling the average rainfall from .06 inches per hour to .11 inches per hour will account for severe rainfall events. This assumption does not come close to the real situation of August 2009.

This 0.11 inches per hour is considered the "wet scenario". No explanation is provided for the use of Buffalo- Niagara Airport data rather than WNYNSC weather station data or data from other local weather stations. The one thing this assures is that the major August 2009 storm is not within the database.

The use of 9.8 years of WNYNSC weather station data as for the FEIS, might be useful, but not knowing which years were chosen is unacceptable, since rainfall has been increasing especially in the last decade. If ten years of data are to be selected, the most recent ten years should be used, because of the increasing precipitation trend.

The climate guidance does not adequately deal with heavy precipitation events.

Key Points:

- Annual average rainfalls tell us almost nothing about the extreme precipitation the site has already experienced or about future events.
- Dry & Wet years are similarly not useful in evaluating extreme events.
- The national average of precipitation falling in very heavy events has increased by 30% already. For the Northeast the increase has been 74%. In addition, rare heavy precipitation events (now occurring once every 20 years) are predicted to increase in the Northeast in the future by 3-4 times.
- Heavy precipitation and rare events are not captured by an assumption that design storm precipitation totals will increase by 25% in this century. The justification for this factor in light of the above should be explained.
- It is the heaviest precipitation, such as from hurricanes and heavy spring snowfall combined with heavy spring rain events that could contribute to maximum flood events.
  Probable maximum floods should be incorporated into West Valley climate modeling.
- Any database developed for West Valley should use similar categories to national climate assessments: very heavy events-- the heaviest 1% of all daily events, rare heavy events- those now occurring once every 20 years.
- Given the tendency toward more precipitation falling in a shorter time period than 24 hours, records should document totals for 1, 2, 3 or more hours within a day.
- In the other direction, such as when there is a stalled hurricane, precipitation over several days should also be captured in the record.

- The climate guidance adopts a definition of extreme events (not more frequent than once per year) based on past scientific research and therefore not consistent with what the climate research is telling us. In this century we may indeed see more than one 5- year storm occurring in the same year for example. For the purposes of a complete record, if multiple extreme events occur, all of these should be recorded.

Uncertainty

We acknowledge some degree of climate uncertainty. However, uncertainty should not be used to deny the already observable real-world climate impacts we are already seeing or to make assumptions for the future that are not conservative at all. Uncertainty about Climate Change is not as all encompassing as this guidance implies. We understand there is uncertainty associated with downscaling and uncertainty associated with predictions beyond 100 years given the incredible unknowns associated with whether governments of the world will confront and rein in corporations because of the destructive potential of climate change. However, uncertainty should not be used to deny the impacts we are already seeing or the consequences based on very sound scientific predictions for this century.

The Climate Scientists we heard emphasized the inability to predict the impacts of climate over long time periods. Given this uncertainty about climate change and the dangerous inventory of long-lived radioactive materials at West Valley, a Citizens Task Force member attending the workshop commented that the Precautionary Principle should be applied to this situation. We concur completely.

There is additional uncertainty associated with erosion potential. Unfortunately, in the case of erosion it appears that only gully erosion is being evaluated by the erosion working group, and not the potential for catastrophic landscape movements, such as landslides. It is the interaction of severe weather events precipitating mass slumping and slides that may release large quantities of radioactive materials to Cattaraugus Creek and Lake Erie. In addition, since the CHILD Model is a research tool and not a predictive tool, we question its use to predict the effects of climate change on erosion, as was done in the FEIS.

Sincerely,

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