Roundtable: "Living with radioactive contamination: a discussion between generations"
Kyiv, Ukraine
May 18th & 19th, 2006

May 18th

Introduction: *Valentina Pidlisnyuk*

- This roundtable is a cooperative force between universities.
- We are bringing together students, faculty, and experts from the U.S.A. and Ukraine to discuss radioactive contamination after Chernobyl and in Native American territory.
- This will begin a new cooperative partnership between Ukraine and the U.S.A.

Muchailo Borusyuk

- This roundtable is a side event of the initial conference on the 24th and 25th of April.

Octaviana Trujillo

- We're honored to be here for this discussion.

Igor Ryduk

- This marks the 20th anniversary of the Chernobyl catastrophe.
- This event impacted the whole world.
- The legal situation associated with the event has been developing.
- A planned project to provide a shelter for the Ukrainian population in the event of another such catastrophe will cost $1.9 billion, and will be completed in 2010.
- The Ukrainian population may not want the shelter, due to the cost, medical impacts, etc.
- Only three places in Ukraine are possible sites for the shelter, and it is being disputed exactly where it will be built.
- The preliminary results of the effects from Chernobyl were found under political pressure and should be doubted.

Gennady Rudenko

- 70,000 families lost at least one member in the disaster.
- Many problems have resulted over the last 20 years.
- The population cannot forget. Memorials remember firefighters, builders, military, medical personnel, etc. who were involved in the cleanup.
- The cleanup cost $7.5 million USD.
- Ukraine needs national support for the elimination of the consequences.
- There are steep financial consequences of waste management.
- This is a long-term project, and will continue for many years.

- We must begin remediation of the pollutants.
- The results of government efforts have not been very good (both Ukraine and international).
- Parliament has held hearings to develop the main policies of the coming years.
- $4.5 billion USD is needed for elimination of consequences.
- This kind of money is not available in the Ukrainian budget.
- More research is also needed, including research to address legal questions associated with the disaster.
- More than 1500 towns were excluded from the list of contaminated areas, and negative health information (reports) from these areas are increasing.
- There are still more that 200 towns in need of radiation treatment.
- The national rehabilitation processes have already finished (concluded). Anti-radiation efforts must be improved for both adults and children.
- Some of the highest levels of radiation are in milk, a popular drink for children.
- Parliament's goal is to return contaminated areas to a normal way of life, and to provide jobs and economic growth.
- They hope to find answers for many of these questions in the next 5 years.

<u>Discussion</u>

- Muchailo Borusyuk and Natalia Kliminko (participants) were both liquidators of the Chernobyl catastrophe.

Yuri M: How effectively was money spent (on the cleanup and rehabilitation efforts)?

- *Igor Ryduk*: 5 billion was spent before Ukraine gained her independence from Russia. 7 billion was spent after. The financial needs associated with the disaster have tripled, and Ukraine cannot afford it. The Chamber of Commerce needs 24-26 billion more.

Yuri M: Where is the limit of how much more money will be needed?

- *M. Borusyuk*: The majority of the money is directed toward social protection and prevention of suffering, and you cannot set limits on that. The second largest amount is put toward environmental protection, and there is not much money available for this. The main part of the money budgeted for environmental protection goes toward remediation and rehabilitation of contaminated soils. The problem will still exist for hundreds of years. The problem can't be liquidated very soon.

Loma Ishii: How will educational policy be instituted in Ukraine, and what will be the main message to kids?

- *I. Ryduk*: Currently, the reasons and consequences of the disaster are discussed in schools and institutes.

Yuri P: What was the maximum level of radioactivity in 1986?

- *M. Borusyuk*: 3000-4000 r./hour. Now, some fields have a few 100 r./hour.

Olena: There are 3 places that have been proposed as possible sites for the shelter. Where are these 3 places?

- *M. Borusyuk*: All 3 are just inside the exclusion zone.

Olena: Will radioactive material be transported to these areas?

- *M. Borusyuk:* It's only theoretical right now. Also, we cannot speak of transportation or burial of waste because no money is available for either. Burying is already underway in the exclusion zone. Radio nuclides with high levels of radioactivity must be sealed in granite. There is a high level of radioactive waste (90 tons?) within the exclusion zone.

Olena: Is the clean-up effort alleviating suffering, or is it a natural progression?

- *I. Ryduk*: There is some national self-purification combined with the clean-up effort.

(Question from a participant without a nametag about terrorism – wasn't translated well)

- *M. Borusyuk:* The main idea of conventions is to prevent the use of materials for terrorism.

Nasbah: How has remediation affected the local communities?

- *I. Ryduk*: Measures were taken for political and social protection of the population before they were included in the exclusion zone. A person can be recognized as "suffering" if they live in the contaminated area. The measures taken were suggested by professionals.

Coffee break

Presentation: *Natalia Grytsyuk*

- 6.7 million hectares of Ukrainian soil is still contaminated, including 1.2 million hectares of agricultural lands.
- There are 5 provinces that are the most contaminated.
- Legislation in 1990 established classification of radioactive zones around Chernobyl and what is necessary to decrease exposure.
    - 1 mSv/year is the dose limit for people in Ukraine.
- Internal irradiation doses come from radiation in food, and from inhalation.
- External doses are from terrestrial density (exposure to heavily contaminated areas).
- 70-90% of the effective population dose in affected areas comes from ingesting contaminated food.
    - Iodine, then cesium and strontium, especially in milk and meat.
- External doses only account for 5-30% of the total dose.
- Radio nuclides taken in from drinking water are very small (few).
- For milk, the limit of cesium (Cs) is 100 Bq/kg.
- For meat, it is 200 Bq/kg.
- Foodstuffs of animal origin are the main source of radionuclide ingestion.

- Formation of dose is also high in mushrooms.
- This affects Ukrainian agriculture – they must not produce food with r.n. contamination above these limits.
- Some farms are still producing milk, etc, above the restriction limits.
    - Contaminated milk with 137Cs levels exceeding 100 Bq/l is produced in more than 400 settlements.
- 20-40 villages produce milk and meat with Cs level 5-15X the safe level.
- Counter measures are limited, and often applied without consideration of the situation.
- Village Yelne example: 770 people live there, including 232 kids under the age of 18. The population keeps 239 milk farms. The products produced by these farms are contaminated with Cs. The average dose for residents is 5 mSv/year. About 95% of the exposure is due to ingestion of local milk, mushrooms, and potatoes.
- The annual intake of food may be overestimated.
- About 500 liters/year/person of milk is produced that cannot be legally sold.
- Self-restriction of milk consumption may cause vitamin and mineral deficiency.
- The most effective way to reduce doses = counter measures in agriculture to reduce radionuclide contamination in milk and meat.
    - Application of enteral sorbents (ferraciene) allows 137Cs (cesium 137 isotope) concentration reduction in milk 3x.
        - The annual cost will be 1.5 – 3.5 million USD
    - In order to provide long-term solutions, there must be provided "clean" forage and improved land (1 – 1.5 million USD).

Loma: How are enteral sorbents applied?

- *N.G*: Ferraciene is the most widely used sorbent.
- The animal requires 2-4-6 grams/day.
- It is used with their forage.
- It is constructed (manufactured) in a laboratory.

Valentina: How stable is the sorbent?

- *N.G*: It is stable, but they must buy it from Russia.
    - It costs $12/kg

Christy: Are all products produced locally, or is there some import from other regions?

- *N.G*: The local population produces products.
- The region is very poor. The natural condition is that the soils are very poor for agriculture (forest land), so people use all land available. Pasture and hay lands are in the worst areas, and gardens are usually in better areas.
- In NW Ukraine, most settlements are now concentrated about 300km from Chernobyl. This geographical pattern is cause by the natural conditions of the region.

Abby: Why are women's exposure doses lower? (The displayed chart shows that women test lower for radiation exposure than men).

- *N.G*: This depends on physiological processes. Women are less sensitive to radiation.

Ukrainian student: Are Russian people more prone to radiation? (Difference in radiation doses)

- *N.G*: The permissive levels in Ukraine are stricter than in Russia, in order to exclude the risk of radiation contamination.
- Strontium is more diverse than Cesium. In Belarus, strontium is more restricted.

Same Ukranian student: How can production of contaminated food be controlled?

- *N.G*: There exist a number of very effective measures for controlling.
    - Disseminate information about contamination of food to the people.
- It is difficult to control private farms. How to apply counter measures in the private sector is the most difficult challenge.

Ukrainian man: Why does production need to be controlled? Can't we just control the sellers?

- *M. Borusyuk:* There is already control over sellers. It is safer to buy food at legal markets, which are not allowed to sell contaminated food. Illegal products are dangerous.
- Lat year, no radioactive mushrooms, cherries, or other produce was detected in Ukrainian markets.
- Before 5-7 years ago, there were some products being transported from northern Ukraine that were detected to be highly contaminated.
- The problem of contaminated food now only exits in 400 villages in Ukraine.

Same Ukranian student: The permissive levels shown in the presentation were from 1992. What were the permissive levels before?

- *N.G*: Before the accident, permissive levels were set according to international levels.
- After 1991, Ukraine adopted levels higher than what they are now. (For example, milk was set at 200Bq/kg in 1991, and now the permissive level is 100).

Olena: Where the major source of contamination is from food and not from environment, it will be easier to control. Current programs give money to people in contaminated areas, but they may spend it on other things and still eat contaminated food. Is there a possibility of bringing in clean food instead of money, or other flexible options?

- *N.G*: There is extensive agriculture in Ukraine. The problem will not exist…???
- *Gennady Rudenko*: 400 villages are contaminated, with 200 being highly contaminated. In these areas, it is better to use production and safety measures.

End 1st session

2:00: National Geographic film on Chernobyl disaster.

Natalia Klimenko – discussion of consequences.

Ukranian man: (summary of his spiel: He is the head of the biophysics department. He had laboratory equipment to measure radiation by mid-May of 1986. He began measuring radiation levels in a large number of locations, even around his building. His results were on an exponential curve- they began decreasing. They didn't know what the highest level was (it would have been highest before he got his equipment). The government then came and took the instruments. On the 14th of May, Gorbachev made his 1st speech. There was less panic during WWII [meaning that everyone panicked more than they did during the war.] Everyone tried to save their families who lived in that area.) Proposition made by this man: We should raise a proposition to the new Parliament to buy personal dosimeters for people living in contaminated areas. This will allow them to measure radiation levels in the market, etc.

Yuri: Can these personal dosimeters really measure radiation levels?

Same Ukrainian man: My son went hiking, and we tried to measure radiation levels on his pants when he returned. We could only measure gamma rays but not (battery radiation?).

Different Ukrainian man: I suggest buying dosimeters produced somewhere abroad, because if they are produced in Ukraine they will only show 0.

Natalia Grytsyuk:

- I think that regular people do not possess the knowledge to deal with these issues and only professionals should be dealing with it.
- Also, it has been 20 years. It's not a disaster here anymore – it's getting better.

Natalia Klimenko: Quality of drinking water

- We began monitoring the water situations around the country.
- We were measuring level of radiation in water. It was extremely high in the first days in May (1986), but began falling.
- This is connected with the fact that the contaminants are in the colloidal state.
- Waste is quickly disseminated.
- After time, cesium and strontium began to grow in amount.
- Our goal is difficult – we had to explain the decrease of radiation in those first days. The technology won't work in the long term.
- Because radionuclides change in time, we need different strategies now.
- So the remark about exponential changes reflects our challenges.

Ukrainian man: They bombs in Japan happened 60 years ago, and they have personal dosimeters.

- *Natalia Klimenko*: The situation is different in Ukraine.

Different man: What water do you drink personally?

- *Natalia Klimenko:* The water here is safe to drink. Radioactive contamination is not that high. But there is some continuing concern.
- There are other problems: contaminated (?) organics, toxic products.
- Kyiv drinking water standards haven't changed since 1984. They are outdated, especially compared with the international community. Especially outdated is the limit on concentration of organic carbon.
- The technology for preparing drinking water goes back to the last century and doesn't meet standards.

Lydia:

- There are still some contaminated soils, especially in the Chernobyl areas.
- Some regions are contaminated with radionuclides and also obsolete pesticides. There is a large amount of obsolete pesticide storage in Ukraine.
- Persistent organic pollutants (pops) degrade to soil and release into the air. They also come down in rain to surface water.
- Often people in rural areas don't understand the danger of the situation.
- There is a dangerous synergetic effect between radionuclides and pops.
- It's important to do practical work in cleaning by bioremediation in areas contaminated by radionuclides.

Loma: Explain the synergy between radionuclides and pops. Do they aggravate each other?

- *Lydia*: We don't have this data here. It is a prediction of a synergetic effect. There has been some work towards predicting this. The research has looked at how pesticides affect animals. They are more dangerous together than separately.

Loma: What do radionuclides emit? Gamma rays?

- (no translation)

Valentina:

- Radioactive contamination in water is calculated over 11 days. 10-6, 10-7, then 10-9, 10-10.
- The decrease is due to degrading.

Loma: Where do radionuclides go in water?

- *Valentina and N. Klimenko*: Into sediments and groundwater.

N. Klimenko: In the first months after the catastrophe, a model was made of how water would be affected. The actual contamination levels were less than expected.

Valentina: The level of contamination of groundwater by radionuclides is less than surface water now, but the level in groundwater is expected to increase.

N. Klimenko: Protective measures were taken in the years after the disaster, including special (?) to absorb radionuclides.

Peter: The model at the museum shows the cloud (of radiation) moving north. Are some areas worse? Is water in rural areas treated?

- *N. Klimenko*: Surface water is always monitored. There was no increase detected in the southwest. Based on data from this, a classification system was made, and all water tested was in the cleanest class.
- *Valentina*: Of the water in rural areas, creeks and ponds have higher concentration of radionuclides than large rivers like the Dnipra.

Cynthia: Is anything bringing suspended sediments back into the water column? Will an anaerobic environment affect this?

- *Natalia Grytsyuk:* Sediments keep the radionuclides on the bottom of reservoirs. The goal is to keep them on the bottom for natural processes to deplete them.
- *N. Klimenko*: There are different layers. (**note: They didn't understand the question)

Ukrainian man: No translation. Some kind of commentary on the impact of Chernobyl on different people on the east and west side of Ukraine.

Paulo Shaparal:

- Chernobyl didn't directly influence western Ukraine, because these regions were not impacted by the radioactive cloud.
- Until 2006, >12,000 victims of the disaster were living in the L'viv region (L'viv – western Ukraine).
- In the opening session, it was said that >$7million was spent on cleanup, and I would like to show figure of elimination. (?)
- This year, victims get higher social payments and longer holidays from work.
- Basic living products are paid for - $20-$40/month for the 1st and 2nd groups.
- There are people waiting for apartments.
- Last year only 8 people got their free apartment.
- There are only 40,000 grivnas available in the L'viv budget (=$8,000), and they pay 100 grivnas/month.
- There are 245,000 grivna available in other regions (=$50,000)
    - L'viv's budget is very small.
- The problem of Chernobyl is a problem of now and the future.
- In 1986, I was still in high school. May of '86 is remembered as the month of tears.
- Mothers cried, but didn't tell kids what happened.
- Kids were quickly sent to Kyiv with no info where they were going.
- There was a mass movement of people from Kyiv to L'viv
- They began to hear what was going on by rumors – there was no official information.
- The unwillingness of the Soviet government to acknowledge the catastrophe led to fatal consequences.

- But, these events led to a democratic movement in Western Ukraine.
- I don't know if it's correct to say, but these events led to the Orange Revolution.
- It is easier to foresee a problem than to fight with the consequences.

Loma: I see parallels with the testing in the Nevada desert. The government planned to test a bomb this year that goes underground and explodes. They want to test it in the same area as the nuclear tests were. The fear is that when it explodes it will disseminate radioactivity. There is a lack of information. The government says there is no danger, but I think there is danger.

- "America is an accident waiting to happen"
- It may take more natural and man-made disasters for America to realize and be prepared.

Ukrainian man: What would have happened if Chernobyl had happened after the Orange Revolution? I think it would have been different, because people are free now.

- *Valentina*: Concerning ecology, data is now widely available.
  - Last summer some warehouses were blown up, and the information was out the next day.
  - After Chernobyl, the first news came on the 14th of May (the explosion happened on the 26th of April). Even specialists were only brought in on the 29th of April.

Female Ukrainian student: On the day of the disaster, I was 2 ½ years old. I asked my mom what she had been doing at the moment of the explosion. She said that she had been at work, and the kids were at kindergarten, and no one knew what had happened. The weather was sunny and windy, and the radiation was spread by the wind. No one knew any information, though it concerned everyone.
In my 11th grade critical defense class, the teacher told the students how we should have protected ourselves. We should have put iodine on the backs of kids, and white sheets on the windows. We also should have consumed salt.

Lydia: My son was 6 months old when the disaster happened. There was no official info, but we were getting info from "Voice of America" radio. Then the station stopped working. I'm a chemist, and had experience with how to protect myself. We left Kyiv on the 4th of May, and on the 5th of May the panic started.

Natalia K: I heard the information from two girls wearing white linen handkerchiefs.

Ukrainian man 2: (To American participants) Did your media help prepare you for Hurricane Katrina?

- *Loma*: The weather scientists were aware and FEMA had a plan, but the magnitude of the hurricane was greater than expected. People weren't prepared. As the government was trying to figure out protocol, the media was documenting everything. Government action was hindered by paperwork. There are many people in Arizona now who are homeless from the Katrina disaster.

- *Cynthia*: My father runs emergency services in Arkansas for small communities. The government restructured after 9-11 and removed all experts from communities. Now there is no one in specific areas with local expertise, and no local center for hurricanes (disaster management).

Becky Begay – presentation on coal mining in Navajo Nation.

Valencia Herder – presentation on water issues in Navajo Nation.

Temashio Anderson – presentation on Uranium mining.

Abby Estes – presentation on Cherokee Nation and Tar Creek.

Discussion:
Valentina: (to Abby) The pH of the water in Tar Creek is 2.9? How can this be?

- *Abby*: Mined rock is left exposed to air, which causes an oxidation process. The miners didn't seal the shafts, and they filled with water. They skipped many crucial steps that could have prevented such acidic water.

Cynthia: The EPA is an executive branch office. The superfund spread costs across the entire industry. The EPA is getting very little money. Brownfield sites are not as toxic as superfund sites.

Peter: Community participation is required by law at superfund sites. Region 6 – Texas, New Orleans.

End Day 1

May 19th

Oleksander Sylin – presentation on radioactive contamination and human health.

Discussion:

Tiffany: What are some examples of heritable effects?

- *Oleksander* – Small increases in abnormalities and birth defects, and also a change in blood or DNA.

Abby: Did the state offer trauma or mental health support?

- *Oleksander*: Yes, a special center was established for Chernobyl victims, to address mental health. However, it was not fully effective.

Nasbah: presentation on Yucca Mountain.

Christy Nations: presentation on her boarding school experience and on ITEP.

Natalia Bilyera (student): presentation on local communities suffering from environmental contamination.

Discussion:

Valentina: Slobotich was a town built near Chernobyl after the accident, to house clean-up workers. Now it is home to monitors. It was built in 1986, and still exists. It is considered pretty safe, because it was built in the opposite direction from where the cloud traveled.

Oleksander: Where I am from, there are special settlements for relocated people. Now there are people moving back to the Chernobyl area. My family was offered a place in Pripyat in 1983, and I'm very glad they chose not to move there!

Cynthia: After Hurricane Katrina, many musicians, dancers, etc. were relocated, and it was hard to be away from their city and culture. But, they find new artists in other places and new musical influences. This results in a change to the culture. (To Natalia Bilyera): Did this occur with the people you referred to in your presentation?

- *N.B*: Yes, they were suddenly exposed to different types of meals, and to different song traditions. It's very hard to be away (from your traditional home).
- *Oleksander*: It's hard on them that they don't have a lot of land for gardens in the cities.

Abby: Is there a stigma attached to these people? Does the state call them victims or survivors?

- *Oleksander*: "Victims" or "suffered." There must be a political move to change the terminology. They accept the term "Chernobylites."

Cynthia: People from New Orleans were originally called refugees, but the people were upset and didn't like being thought of as "victims." They prefer "Katrina People." Terminology is very important.

Lesya German: presentation on the importance of access to ecological information for solving environmental problems.

Discussion:

Cynthia (to students): There wasn't such good access to info (no cell phones, internet, etc.) when Chernobyl happened. If there was a disaster now, would there be more access to information and how would you handle it today?

- *Oleksander*: It is much better today in Ukraine.
- *Yuri*: Journalists today can report what they see. Before, they were under some pressure (to present things in an "edited" way).

- *Olena*: We learn things faster, but the information is still coming from officials. Many of my friends use the internet for entertainment only, not for information acquisition.
- *Oleksander*: Before 1986, people were afraid (to come out against the government).
- *Valentina*: Today we have the young, middle, and older generations.
    - There was a recent investigation into where our president's son got a new car (some hotrod). The story was in papers within a couple of days. No staff members were dismissed from the paper.
    - The situation is improving each day in Ukraine.
    - They may not get the same quality of information in Russia.
- *Yuri*: But we still don't have information on official spending and funds. We have to be able to find the information in order to access it.
- *Ukrainian student*: Now there is a question of personal interest and involvement. It is easier to find people's personal opinions with the internet. We also have better access to what measures to take in case of a disaster.
- *Temashio*: The U.S. failed to react to Hurricane Katrina in a timely manner.
    - The tribes have a different reality when it comes to access of information.
    - There are over 10,000 households on the Navajo reservation that have no electricity.
    - The tribes are the last to know about an emergency.
- *Peter*: Specific information usually doesn't show up on the internet. You must go directly to the source, and even then it's not always immediately available. Access to information is not helpful unless it leads to action. Even if we hear about an emergency immediately, do we have a plan?
- *Loma*: Tribes in America are beginning to institute their own research guidelines. The goal is to produce authentic, reliable data that people understand. These are important steps in implementing change.
- *M*. (Ukrainian woman?): We have seen an increase in cancer rates, especially breast cancer in women. There is also the problem of deficiency in medical treatment.
    - There has been an increase in carcinogens and cars in big cities.
    - Cigarette smoke and alcohol can be confounders, and people don't understand their impact.
    - In Ukraine, there is a deficiency of proteins in food.
    - All of these thing impact work performance, and the health of children.
    - I was 14 at the time of the disaster. Students had been trained to give a presentation on May 1st, and they made red paper flowers to represent apples. We must make the apple trees blossom for us and the next generation.

Afternoon session at the American Embassy in Kyiv

Presentation by PR person:

- Problem with contamination by the cesium 137 isotope in the exclusion zone.
- Iodine tablets are an essential treatment, especially for exposed children.

- ½ life = 30 years. According to the laws of exponential decay, it will take 300 years to reach 0.
- We measure nuclear units in curies.
- "Red Forest" within exclusion zone. The radiation changed the pine needles to a red or brown color.
- Mice in the exclusion zone have been studied. Mice absorb 10,000x the radiation (that people do), bud don't show any genetic mutation. (**thought from Heidi: They're not catching the dead mice, or maybe mice with mutations aren't being caught.)
- The U.S. does not reprocess nuclear fuel. France, Japan, and Russia all reprocess their nuclear fuel.
- It is going to cost 1.1 billion USD to complete the shelter to encase the disaster site.
    - 203 million will come from the U.S.A.
- Animal life is thriving within the exclusion zone.
- National Institute of Health.
- 50% of Ukraine's energy is nuclear.
- 20% of America's energy is nuclear, and 90% of France's energy.
- All nuclear plants have emergency operating instructions now, in case of a disaster.

Becky: Why isn't the concentration on developing wind or solar energy?

- *PR guy*: At the current level of technology, it isn't really possible for solar energy to meet national needs.

Olena: Is the U.S. the only country doing extensive research in Chernobyl, and why are they the largest contributor?

- *PR guy*: Germany, Japan, and other countries also contribute.
    - An accident like this affects the world, but mainly surrounding countries. The majority of the exclusion zone from Chernobyl is in Belarus.
    - Safe nuclear energy is important to the U.S. and to the world.
    - The U.S. wants to secure borders, but also the sources of nuclear energy.
    - They want to make sure these sites are secure.
    - Radioactive waste (both solid and liquid) stays at the site. It is never shipped.
    - There is also a central spent nuclear fuel storage facility. The spent fuel is shipped in old containers.

Video shown by Loma.

Declaration edited and approved.