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INTERNATIONAL FATUM TECHNOLOGIES

Management of NORM found in Kazakhstan

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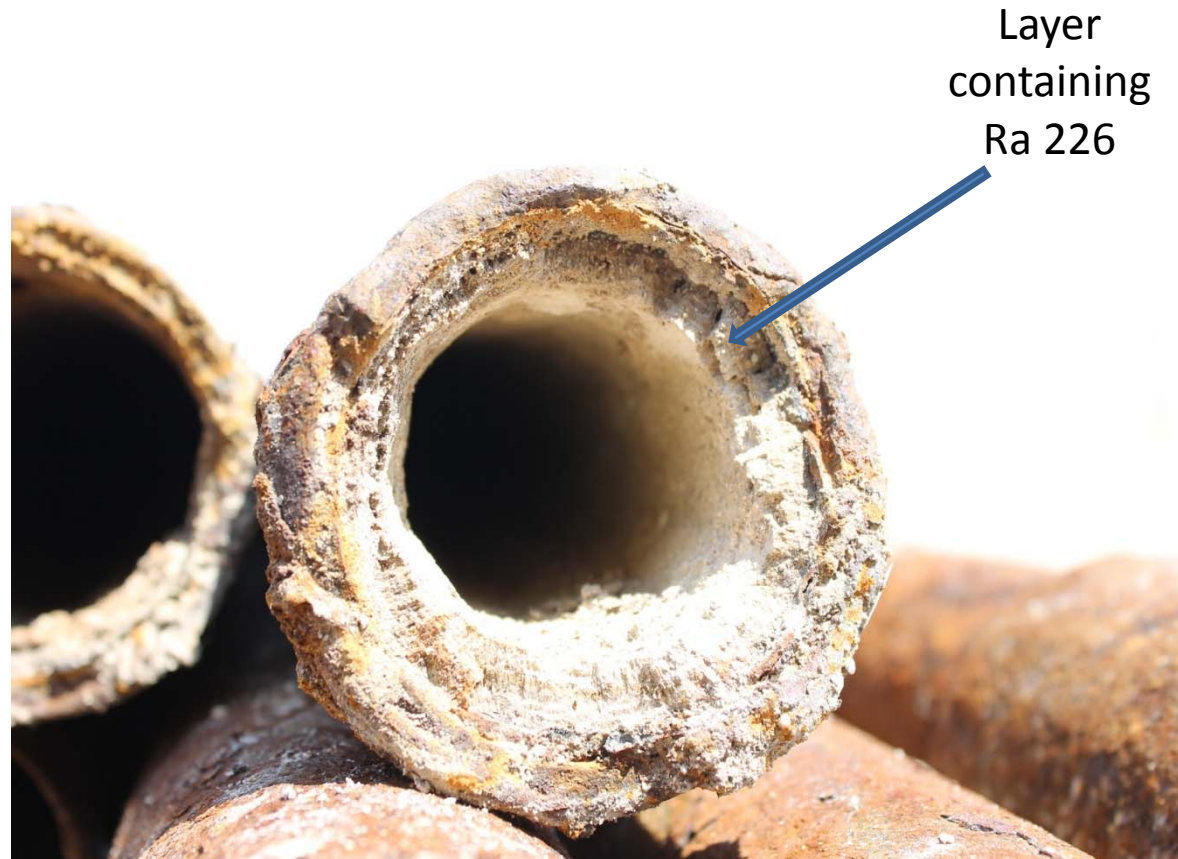
OIL PIPE WITH RADIOACTIVE DEPOSITS

Oil-pipe before cleaning

Gamma radiation

~ 4.0 $\mu\text{Sv}/\text{hour}$

If $>0.2 \mu\text{Sv}/\text{hour}$ above
natural radiation
background = *RW*





REQUIREMENTS IMPOSED ON NORM CLEANING TECHNOLOGIES IN KAZAKHSTAN

HEALTH&SAFETY REGULATIONS

Approved by the Resolution of the Government of the Republic of Kazakhstan dated 03.02. 2012, No.202

The regulations establish health & safety requirements for radiation safety during ... treatment with ionizing radiation sources ... radioactive materials ... **treatment of radioactive waste materials...** application of materials and products contaminated by radionuclides... implementation of operating radiation control **at facilities, including oil and gas complexes, and for scrap metal ...**

.....
206. **Separation of radioactive waste** in organizations **must be conducted directly at the places of their formation, and the radioactive waste must be separated according to the** following:

- 1) Radioactive waste categories;
- 2) **physical form (solid and liquid);**
- 3) physical and chemical characteristics;
- 4) **nature (organic and nonorganic);**

264. **Scrap metal is allowed for sale only if:**

- 1) **EDR gamma-radiation** from the scrap metal surface does **not exceed 0.2 mcSv/h** above the natural radiation background of the area;
- 2) **alpha radiation** flow density, not more than **0.04 Bq/cm²**;
- 3) **beta radiation** flow density, not more than **0.4 Bq/cm²**.



UNIQUE IFT-NORM PATENTED TECHNOLOGY

- **SPECIALLY DESIGNED WORKING SOLUTION IFT-KCD AND IFT-N**

-Carefully balanced mixture of water, acids, soaking agents, tensides, inhibitors and polymers

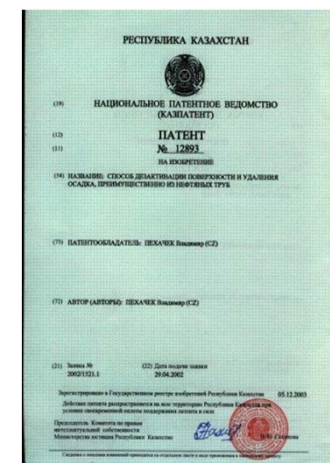
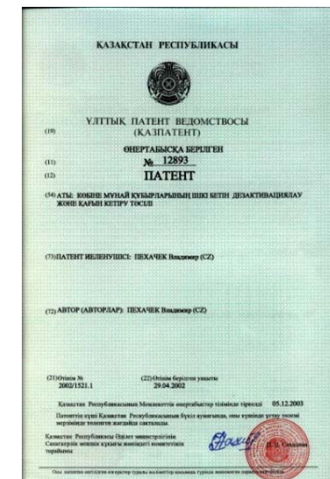
- **IFT-KCD REDUCES BINDING POWERS OF ADHESION AND COHESION BETWEEN THE PIPE SURFACE AND THE DEPOSITS**

-the IFT-KCD solution infiltrates through the deposits and loosens them from the pipe surface

- **PIPES CAN THEN BE CLEANED USING LOW PRESSURE (200-600 BAR) JETS**

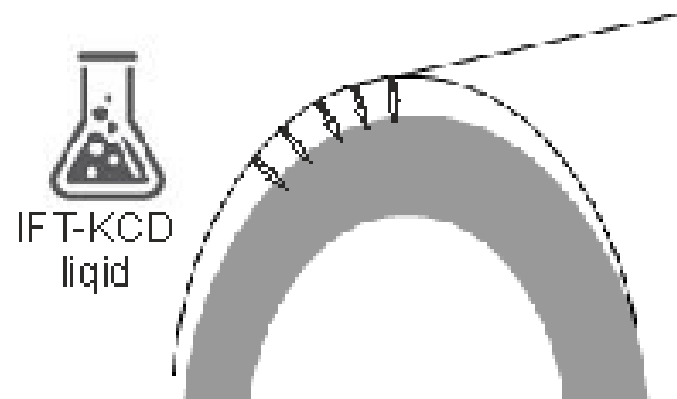
This avoids homogenization of radioactive deposits and ARWS, enabling their gravitational separation

- **IFT-N NEUTRALIZES THE ACTIVITY OF IFT-KCD WHEN PIPE IS COMPLETELY FREE FROM THE RADIOACTIVE DEPOSITS**





HOW THE IFT-NORM TECHNOLOGY WORKS



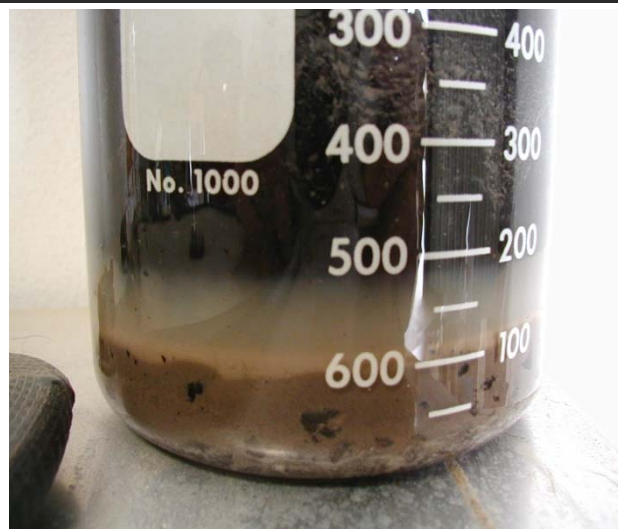
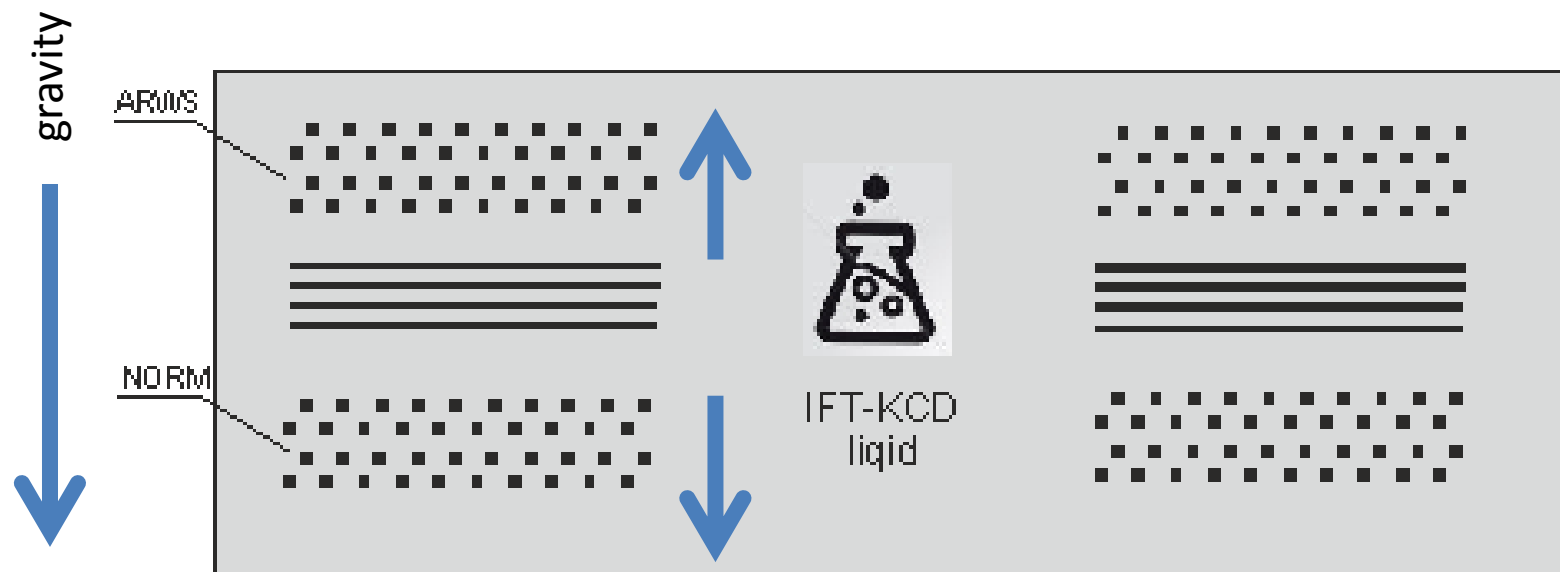
IFT solutions are based on the change of adhesive power (cohesion) and tenacity



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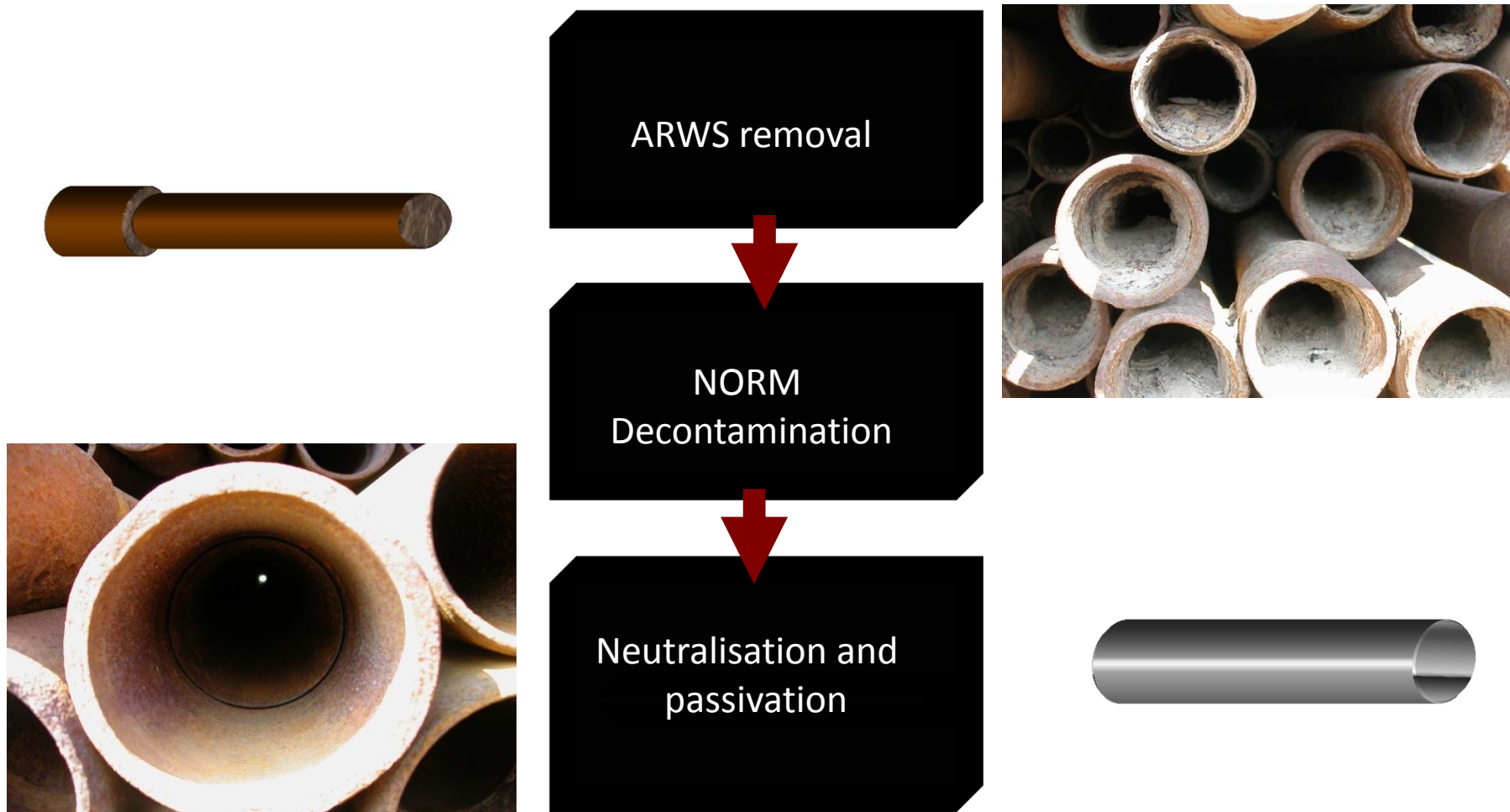
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HOW THE TECHNOLOGY IFT-NORM WORKS





Three phases of pipe treatment





IFT - SOLUTION



WASTE REDUCTION



NORM (2-5%)



CLEAN PIPES (90-93%)



PARAFFIN+ARWS (3-7%)



ADVANTAGES OF IFT -NORM TECHNOLOGY



•NO DAMAGE TO CLEANED SURFACE





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ADVANTAGES OF IFT-NORM TECHNOLOGY

■ LOW LEVEL OF WATER CONSUMPTION

- Minimal requirements for water
- very suitable for territories with limited sources of water
- ideal for deserts and steppes





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ADVANTAGES OF IFT-NORM TECHNOLOGY

- **CLEANED PIPES HAVE NATURAL LEVELS OF RADIATION**





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ADVANTAGES OF IFT-NORM TECHNOLOGY

■ USE OF LOW PRESSURE JETS

- working liquid pressure is 200-600 bar

- pressure over 800 bar causes homogenisation of radionuclides, paraffins and other deposits with the cleaning agent

- IFT-NORM technology does not produce any homogenised radioactive products



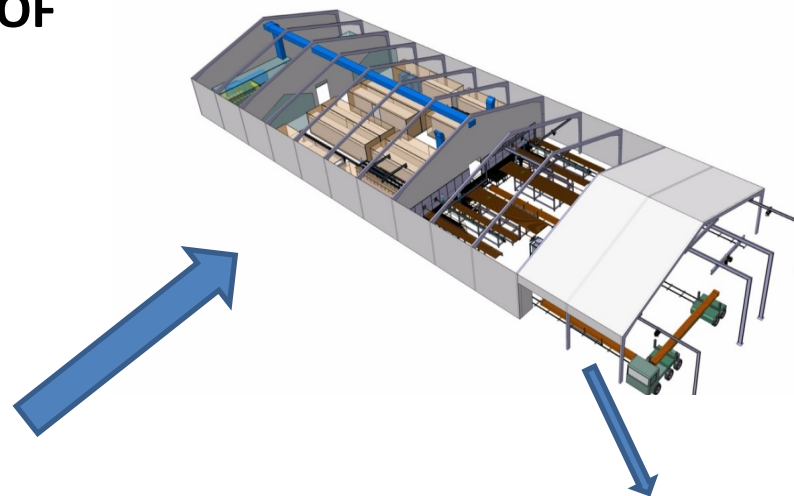


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ADVANTAGES OF IFT-NORM TECHNOLOGY

- 25-50 – FOLD REDUCTION IN VOLUME OF LLRW



No liquid RW



[lori.ru / 276.718](http://lori.ru/276.718)



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MILESTONES IN THE DEVELOPMENT OF IFT-NORM TECHNOLOGY

1999 IFT Ilc + Kazakh Institute of Nuclear Physics (INP)
Research



2001 IFT Ilc + INP
First industrial test
10 000 tons of pipes
cleaned



2002 V. Pechacek (CZ)
RoK #12893 Patent

2003-2010 IFT Ilc
Tested in Russia, Czech Rep., Iran, Venezuela, Malaysia,
U.A.E.

2010 - 2011 IFT Ilc + INP
CHTC-800 Project
documentation

Licensed for use in the EU and the Russian Federation
More than 70 000 tons of pipes were cleaned



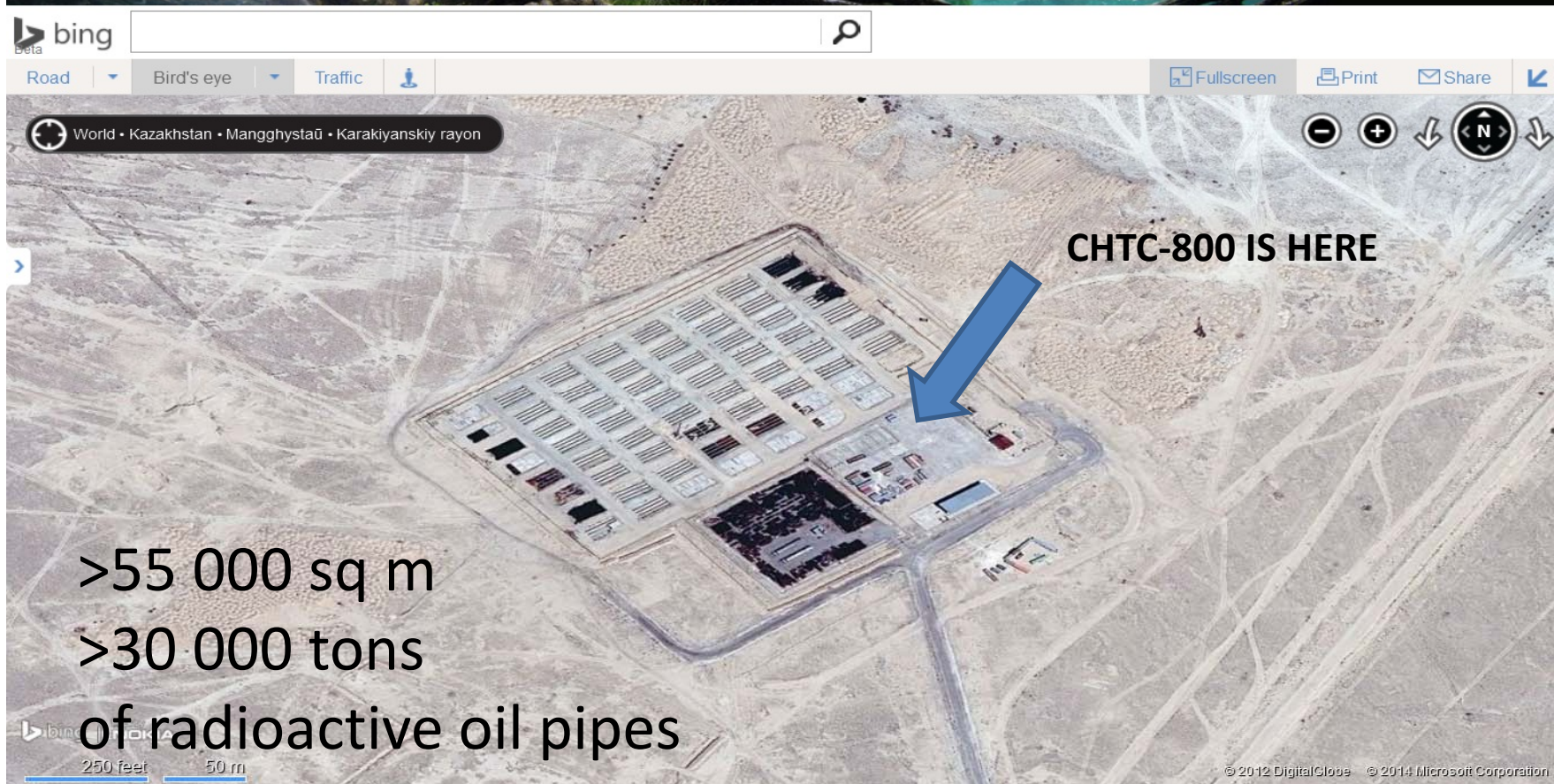
2012 - 2014 July IFT Ilc + Kazakh Park of Nuclear Technologies
Production of CHTC-800
equipment

2014 July - 2015 Feb
construction
in Zhanaosen Kazakhstan





LLRW OIL PIPE DEPOSITORY IN WESTERN KAZAKHSTAN

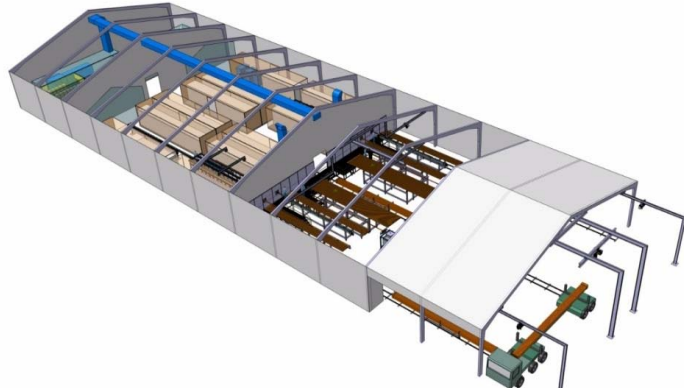




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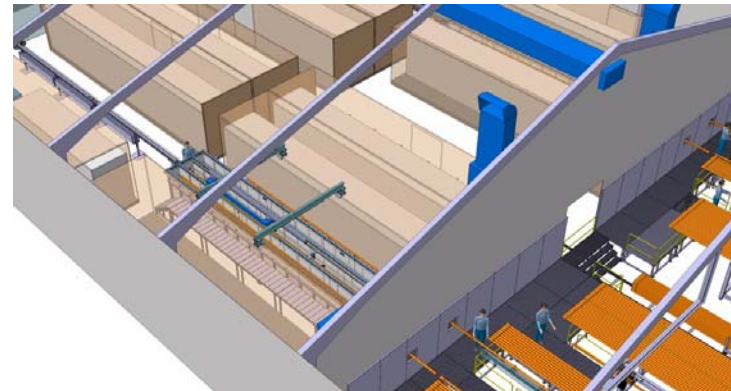
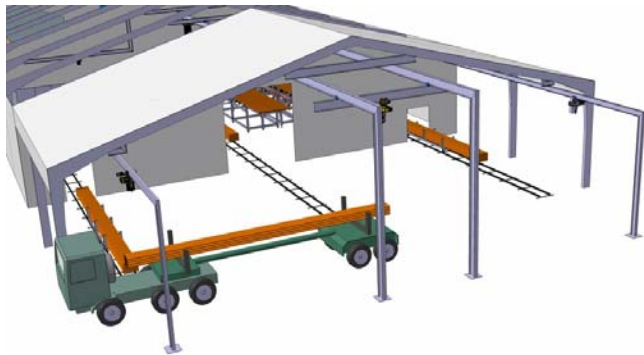
OVERVIEW OF CHEMICAL TECHNOLOGICAL COMPLEX IFT-CHTC-800



Capacity	800 pipes NKT-73/day
LLRW volume	125-400 tons/year
LLRW activity	50 - 150 kBq/kg
Total solid NORM activity	~1 Ci

Expected cost of cleaning and decontamination 1 pipe <USD 20

Total investment: USD 9 650 000





LLRW OIL PIPE DEPOSITORY IN WESTERN KAZAKHSTAN



>55 000 sq m
>30 000 tons
of radioactive oil pipes

What is being stored here?

1. METAL
2. AIR
3. ARWS
4. NORM



ECONOMICS OF LLRW STORAGE*

Country	Cost of construction of 1 m ³ of LLRW storage	Running costs of storing 1 m ³ LLRW
Germany	~ 4 000 €	~ 10 000 €
Sweden	1 700 \$	~ 4 000 \$
UK	~ 4 000 €	~ 10 000 €
USA	3700 \$	5 000-10 000 \$
Russia	~100 000 rubles	134 000 rubles - 402 000 rubles

* U.V.Chechetkin "Handling radioactive waste and spent nuclear fuel in GNRFNIIAR", Dimitrovgrad, 2006.



LLRW OIL PIPE DEPOSITORY IN WESTERN KAZAKHSTAN





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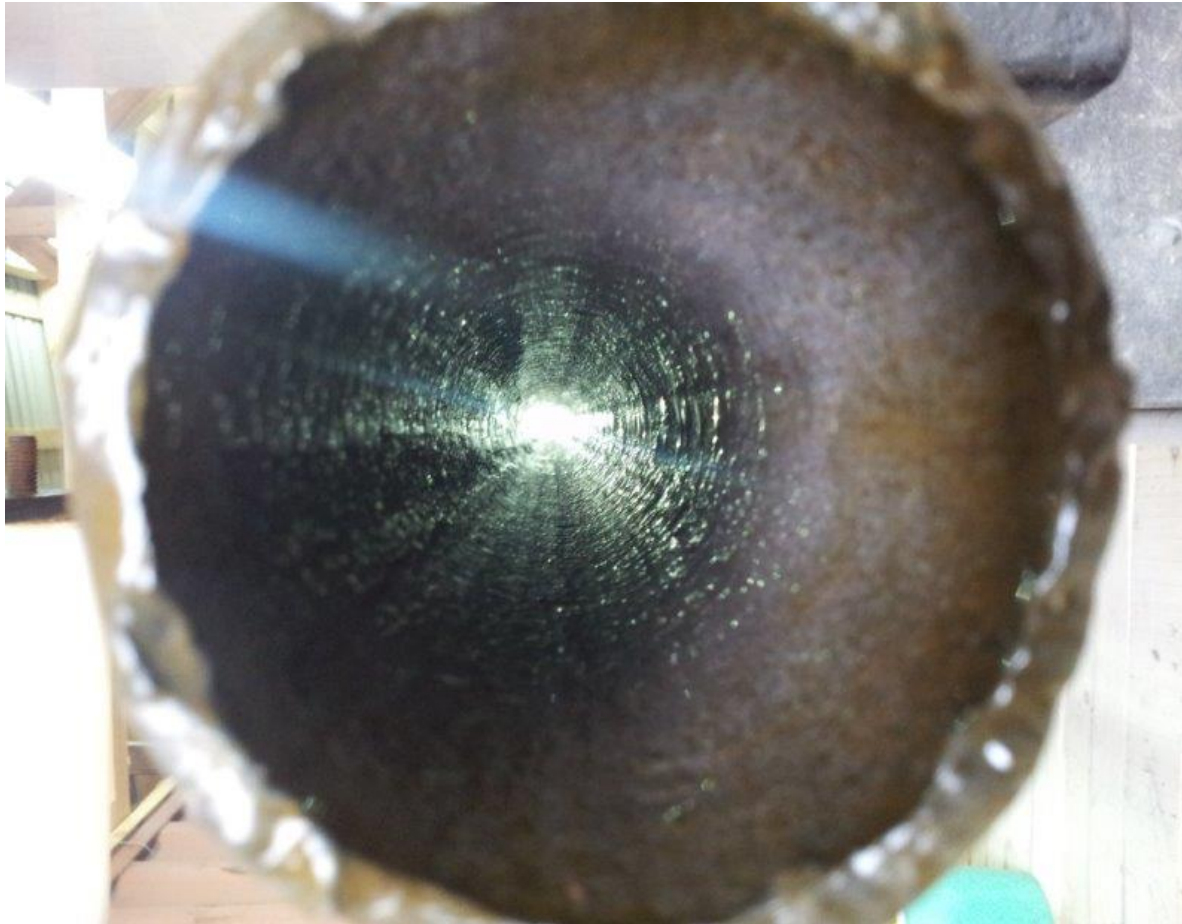


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March 2015 – COMMISSIONING CHTC-800

April 2015 – YOU ARE INVITED TO VISIT CHTC-800 IN OPERATION





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THANK YOU FOR YOUR ATTENTION!