Project ISTC - K-1240p

"Post-containment Management and Monitoring of Mercury Pollution in Site of Former PO "Khimprom" and Assessment of Environmental Risk Posed by Contamination of Groundwater and Adjacent Water Bodies of the Northern Industrial Area of Pavlodar"

Quarterly technical report

on the work performed from 1 January 2009 - to 31 March 2009

Quarter 14

Non-profit JSC "Almaty Institute of Power Engineering and Telecommunication", BG Chair of Environmental Technology

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PhD (Chemistry)

05.05.2009

Signature / Data

1. Summary of Technical Progress

1.1. Current Technical Status

Task Subtask	Start (quarter)	End (quarter)	Status / Comments
1.1.	1	16	Implementing /equipment and materials have been ordered to facilitate chemical-analytical laboratory of Participant Institution JSC "Kaustik".
1.2.	4	8	Completed.
1.3.	1	15	Implementing / Chemical and analytical works on determination of mercury contents in samples of soil and biological material have been completed.
2.1.	1	2	Completed
2.2.	3	4	Completed
2.3.	5	6	Completed
2.4.	7	12	Completed
2.5.	10	12	Completed.
2.6.	8	8	Replaced with other works in 14-16 quarters.
2.7.	8	8	Replaced with other works in 14-16 quarters.
2.8.	9	10	Replaced with other works in 14-16 quarters.
2.9.	9	10	Completed
3.1.	1	16	Implementing /equipment and materials have been ordered to facilitate chemical-analytical laboratory of Participant Institution JSC "Kaustik"
3.2.	4	6	Completed
3.3.	8	8	Replaced with other works in 14-16 quarters.
3.4.	8	8	Completed
3.5.	14	15	Implementing/Hydro-dynamic model has been produced for the area of possible spread of mercury pollution.
3.6.	15	16	
4.1.	1	2	Completed
4.2.	2	10	Completed
4.3.	3	11	Completed
4.4.	4	8	Completed
4.5.	4	9	Completed
4.6.	14	16	Implementing/Publication has been prepared on mercury pollution of biota of the wastewater storage pond Balkyldak.
5.1.	1	16	Suspension in work.
5.2.	1	16	Implementing /Preparation of the special ISTC Session in the framework of 9th International Conference "Mercury as a Global Pollutant" (Chine, Guiyang, 7-12 June, 2009).

1.2 Tasks of the work plan

Task 1: Study of the movement of mercury in the groundwater rise in depressed area in saturated and unsaturated zones and its accumulation in the shallow ponds and vegetation. Development of management strategy to contain the risk to population in the vicinity and livestock.
Subtask 1.1: To facilitate the Laboratory of environmental protection of PCP with the equipment for conduction of mercury monitoring, and to train the local staff

- **Results by the end of the current quarter**

Request for procurement of laboratory equipment and materials for Participant Institution JSC "Kaustik" has been prepared and sent to ISTC.

- **Personnel Commitments**

Name	Category	Work days
AIPET		
Uskov Grigoriy Aleksandrovich	2	5
Yakovleva Lyudmila Vasil'evna	2	10

Task 1: Study of the movement of mercury in the groundwater rise in depressed area in saturated and unsaturated zones and its accumulation in the shallow ponds and vegetation. Development of management strategy to contain the risk to population in the vicinity and livestock.
Subtask 1.3.: To carry out 3-year monitoring program (sampling and analysis), including the monitoring of soils, surface and ground water, aquatic biota, milk, and grazing grass in the close vicinity of groundwater contamination. To measure the hydrogeological parameters (water levels in boreholes, pH, temperature, redox potential) simultaneously with groundwater sampling.

- **State / Situation at the beginning of the current quarter**

Field works have been conducted on investigation of mercury pollution within the northern outskirt of Pavlodar city: … (iv) Participant Institution JSC "Kaustik"has taken 240 topsoil (0-10 cm layer) samples under the regular grid within the area of demercurization of the former PO "Khimprom", Pavlodar city.

Soil samples were homogenized and divided into duplicates: one of duplicates was sent to Stepnogorsk to Institution Participant "Biomedpreparast – Engineering Centre" Laboratory of Biomonitoring (BMP) for analysis, the another one – to Almaty to the stationary laboratory of AIPET.

- **Fulfilled work**

Stepnogorsk Laboratory of Biomonitoring of Participant Institution BMP and Almaty stationary Laboratory AIPET have carried out the analysis of the duplicates of 240 soil samples taken within the territory of chlor-alkali production of PCP. The results reproducibility is satisfactory.

- **Results by the end of the current quarter**

The results of soil samples analyses have been brought in a Summary Table. 10% of soil samples contain mercury more than 1 g/kg.

- **Personnel Commitments**

Name	Category	Work days
Kaustik		
Karimov Sharapat Sattarovich	1	33
Kosyashnikova Ol'ga Mikhailovna	1	30
BMP		
Balpanov Darkhan Serikovich	2	26
Volkov Oleg Efimovich	2	54
Smirnova Svetlana Yurievna	1	26
Prikhodko Tatyana Vladimirovna	1	26
Kirplyuk Eduard Valentinovich	1	24
Starodubova Valentina Fedorovna	1	20
Zhulikova Xeniya Sergeevna	2	30

Mukanov Kassym Kassenovich	2	23
Abeldenov Sailau Kassenovich	2	23
AIPET		
Uskov Grigoriy Aleksandrovich	2	17
Stepanov Vladimir Aleksandrovich	3	50

Task 3: Study of the spread of groundwater plume contaminated with oil products from the territory of Pavlodar Oil Refinery; development of model and assessment of environmental risk posed by oil-products contamination of groundwater in the Northern industrial area of Pavlodar. Subtask 3.1: To facilitate the Laboratory of environmental protection of PCP with the equipment to monitor contamination of groundwater with oil products, and to train the local staff.

- **Results by the end of the current quarter**

Request for procurement of laboratory equipment and materials for Participant Institution JSC "Kaustik" has been prepared and sent to ISTC.

- **Personnel Commitments**

Name	Category	Work days
AIPET		
Uskov Grigoriy Aleksandrovich	2	5
Yakovleva Lyudmila Vasil'evna	2	10

Task 3: Study of the spread of groundwater plume contaminated with oil products from the territory of Pavlodar Oil Refinery; development of model and assessment of environmental risk posed by oil-products contamination of groundwater in the Northern industrial area of Pavlodar. Subtask 3.5: To draw up the forecasts for the spread of oil products with groundwater using the hydrogeological model in the Northern industrial area of Pavlodar

- **State / Situation at the beginning of the current quarter**

The archival data analysis has been conducted. The boundaries of a local model of the area of oil products contamination have been chosen. Detailed hydro-geological cross-sections of the modeled area have been constructed. Hydro-geological conditions have been schematized (number of layers of the local model has been determined, their boundaries have been drawn at the hydro-geological cross-sections, internal and external boundary conditions have been established for the local model etc.). The cross-sections and the results of schematization have been introduced in Geographic Information System (GIS) produced by means of MapInfo software as well as in the data base produced by means of FoxPro software. Using MapInfo software the hydro-dynamic scheme has been constructed.

The results of schematization have been transformed into formats applicable to GMS software modeling system.

- **Fulfilled work**

Based on the regional model of groundwater of the Northern industrial area of Pavlodar a hydro-dynamic model has been produced for the area of possible spread of groundwater contaminated with oil products between Pavlodar Oil Refinery and Pavlodarskoe village.

- **Results by the end of the current quarter**

Epignostic and prognosis tasks have been expanded for changing a groundwater table surface using the hydro-dynamic model.

- **Personnel Commitments**

Name	Category	Work days
IHH		
Panichkin Vladimir Yurievich	2	20
Miroshnichenko Oxana Leonidovna	2	20
AIPET		
Kamberov Rustam Irkenovich	2	40

Task 4: Assessment of possibility to contain the risk posed by mercury pollution of lake Balkyldak including the fish within it:
Subtask 4.6: To identify the pathways of Hg bioaccumulation and to develop the possible solutions to break these pathways.

- **Fulfilled work**

The results of study of mercury contamination impact upon the biota of the wastewater storage pond Balkyldak have been summarized during preparation of the abstract and presentation on the risk assessment posed by mercury contamination of the pond. The paper M. Ilyushchenko, P. Randall,R, T. Tanton , L.Yakovleva, A.Ubas'kin, R.Kamberov. "Mercury risk assessment from a wastewater storage pond in Pavlodar city, Northern Kazakhstan" was published in proceedings of Fifth Battelle International Conference on Remediation of Contaminated Sediments (Florida, February 2-5, 2009).

- **Results by the end of the current quarter**

Presentation and a paper M. Ilyushchenko, P. Randall,R, T. Tanton , A.Ubaskin, G.A. Uskov "Mercury Contamination of a Wastewater Storage Pond of Chlor-Alkali Production in Pavlodar and Problems of its Remediation" have been prepared for 9th International Conference on Mercury as a Global Polutant (Guiyang, China June 7-12, 2009).

- **Personnel Commitments**

Name	Category	Work days
PSU		
Ubaskin Alexander Vasilievich	2	10
Kalieva Aida Akhmetbekovna	2	17
AIPET		
Ilyushchenko Mikhail Alexeevich	1	5
Kamberov Rustam Irkenovich	2	5
Yakovleva Lyudmila Vasilievna	2	10

Task 5: To draw up and discuss with local stakeholders the recommendations for the 2nd stage of demercurization and other remediation activities in the area of the former PO "Khimprom" (Northern industrial area of Pavlodar), including the recommendation for abolishment or further safe use of the wastewater storage pond – lake Balkyldak:
Subtask 5.2: To hold the workshops, press-conferences and presentation in order to discuss the interim results

- **Fulfilled work**

For the 9th International Conference on Mercury as a Global Pollutant (Guiyang, China June 7-12, 2009) arrangement of Special Session of ISTC has been proposed where participation of 11 representatives of Kazakhstan and Russia is planned. Four presentations/papers on the results of K-

1240p project have been provided:

1. V.Yu.Panichkin, O.L.Miroshnichenko, M.A.Ilyushchenko, P.M.Randall and T.W.Tanton. "Evaluation of demercurization efficiency of chlor-alkali production in Pavlodar City, Kazakhstan".

2. M.A.Ilyushchenko, L.V.Yakovleva. "Problems of demercurization of industrial objects within the former USSR".

3. O.L.Miroshnichenko, V.Yu.Panichkin, M.A.Ilyushchenko, P.Randall, T.W.Tanton. "Mathematical modeling of groundwater mercury pollution, post-demercurization monitoring and evaluation of clean-up efficiency (case of Northern industrial area of Pavlodar City, Kazakhstan)".

4. M. Ilyushchenko, P. Randall,R, T. Tanton , A.Ubaskin, G.A. Uskov. "Mercury Contamination of a Wastewater Storage Pond of Chlor-Alkali Production in Pavlodar and Problems of its Remediation".

- **Results by the end of the current quarter**

Four abstracts have been prepared for the 9th International Conference "Mercury as a Global Pollutant", one of them has been presented as a poster presentation.

- **Personnel Commitments**

Name	Category	Work days
AIPET		
Ilyushchenko Mikhail Alexeevich	1	10
Yakovleva Lyudmila Vassilievna	2	10
Kamberov Rustam Irkenovich	2	10
Mukhamejanov Khamit Valiakhmetovich	2	55

Task 0.: Project Management

- **Fulfilled work**

The technical report for the Quarter XIV has been prepared.

- **Personnel Commitments**

Name	Category	Work days
AIPET		
Ilyushchenko Mikhail Alexeevich	1	40
Yakovleva Lyudmila Vassilievna	2	15
Stepanov Vladimir Alexandrovich	2	5
Ibraeva Alma Abylkasymovna	3	15

2. Summary of Personnel Commitments

	Number of persons	Total days	Total grants (US$)
Category I	7	214	10568
Category II	12	405	5550
Category III	2	70	1675
Category IV	1	10	200
Total:	22	699	17993

2.1. Change in the project personnel

Ichthyologist Alexander Vasilievich UBASKIN has been involved in Participant Institution PSU as K-1240p project participant who before had participated in the project as a volunteer.

3. Preparation of reports and publications

1. Technical report for XIV quarter has been prepated
2. The paper: M. Ilyushchenko, P. Randall,R, T. Tanton , L.Yakovleva, A.Ubaskin, R.Kamberov. "Mercury risk assessment from a wastewater storage pond in Pavlodar city, Northern Kazakhstan" has been published n the proceedings of Fifth Battelle International Conference on Remediation of Contaminated Sediments (Florida, February 2-5, 2009)

4. Significant Travel and Meetings

4.1. Travel and meetings inside CIS

no.

4.2. Travel and meetings outside CIS

no.

5. Cooperation with foreign collaborators

Joint publications were being discussed by Email with Paul Randall, the project coordinator.

6. Procurement

Number in accordance with Work Plan	Name	Status
1E	Millennium Merlin 1631 System for low level mercury Determination, supplied ready to run and includes atomicfluorescence detector, vapor generator, gold amalgam pre-concentrator integrated perma-pure dryed system, Millennium windows software, interface cables, installation kit, consumables kit, user manuals. **10.035** (PS Analytical: Arthur House, Crayfields Industrial Estate, Main Road, Orpington, Kent, BR5 3HP,UK; e-mail: psa@psanalytical.com, tel.: +44 1689 891211, fax: +44 1689 896009, www.psanalytical.com)	
2E	Anayzer Fluorat-02-3M with water analyses methods and kits for oil, anionic surfactants, pfenoles, nitrites, sulphides, iron, copper, zinc, aluminium, arsenic, turbidity. **Lumex, www.lumex.ru**	
3E	Pipette, Eppendorf Research adjustable, 2-20 µL, **311000.130**, www.eppendorf.de	
4E	Pipette, Eppendorf Research adjustable, 20-200 µL, **311000.157**, www.eppendorf.de	
5E	Pipette, Eppendorf Research adjustable, 100-1000 µL, **311000.165**, www.eppendorf.de	
6E	Pipette, Eppendorf Research adjustable, 500-5000 µL, **311000.173**, www.eppendorf.de	
7E	Flowmeter, King, 7430 Series, specification for ordering: **74C-123G081-3-2-1-1-2-0**; King Instrument company, www.kinginstrumentco.com. One may other rotameter with high measuring level above 0.25 cubic meter/h. For example russian rotameter РМА-0,25ГУ3	
8E	Labclear gas filter, **Sigma-Aldrich, 371238-1EA**, www.sigmaaldrich.com	
9E	Copy machine Canon IR 2016J, A3 , **50276, Alsi innovation**, Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
10E	Notebook HP 530 C-M 520 15.4 512/80 PC, **60939, Alsi innovation**, Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
11E	Notebook NB ASUS G2S (482) 17.1 "WHGA+Core 2 Duo T7500 2.2G 2048,200, DVD+RW-LS. GF8600MGT256, Wi-Fi, Cam, BT.TV. GameBag, Mouse, VHPru (G2S-2A7R/8SS/V/M/TV/WN/B/CM), **Alsi innovation**,	

	Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
12E	Balances AX200, **2250040, Laborfarm,** Kazakhstan, Almaty, tel +77272583585, e-mail t22@altey.kz	
13E	Top-loading balances BL620S, **Laborfarm,** Kazakhstan, Almaty, tel +77272583585, e-mail t22@altey.kz	
14E	Distiller YA-ZD-10, 10 L/h, **2560002, Laborfarm,** Kazakhstan, Almaty, tel +77272583585, e-mail t22@altey.kz	
15E	Drying oven ШС-80-01 СПУ, +50 …+200^{0}C, **2090004, Laborfarm,** Kazakhstan, Almaty, tel +77272583585, e-mail t22@altey.kz	
16E	Ion meter И-160МИ, **2580004, Laborfarm,** Kazakhstan, Almaty, tel +77272583585, e-mail t22@altey.kz	
17E	Analyzer for carbon AH-7560.1, **www.inms.ru**	
18E	**50789** Soft Microsoft Windows XP HE 1pk **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
19E	**50786** Soft Microsoft Office 2003 basic Rus **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
1M	Consumables for Millennium Merlin system. Sample Valve **M025V002,** (**PS Analytical**: Arthur House, Crayfields Industrial Estate, Main Road, Orpington, Kent, BR5 3HP,UK; e-mail: psa@psanalytical.com, tel.: +44 1689 891211, fax: +44 1689 896009, www.psanalytical.com)	
2M	Consumables for Millennium Merlin system. MM type Gas Liquid Separator **M025G004,** (**PS Analytical**: Arthur House, Crayfields Industrial Estate, Main Road, Orpington, Kent, BR5 3HP,UK; e-mail: psa@psanalytical.com, tel.: +44 1689 891211, fax: +44 1689 896009, www.psanalytical.com)	
3M	Consumables for Millennium Merlyn system. Probe Unions **A200T005,** (**PS Analytical**: Arthur House, Crayfields Industrial Estate, Main Road, Orpington, Kent, BR5 3HP,UK; e-mail: psa@psanalytical.com, tel.: +44 1689 891211, fax: +44 1689 896009, www.psanalytical.com)	
4M	Eppendorf tips, 2 - 200 µL, 1000 tips, **0030000.870**, www.eppendorf.de	
5M	Eppendorf tips, 50 - 1000 µL, 1000 tips, **0030000.919**, www.eppendorf.de	
6M	Eppendorf tips, 100 - 5000 µL, 500 tips, **0030000.978**, www.eppendorf.de	
7M	Changeable agnt w. moisture indicator, Cat.-**ALDRICH**-Nr. **362840**	
8M	**49361** Toner Canon C-EXV14, black, for copy machine Canon IR 2016J, **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
9M	Consumables for Millennium Merlin system. Pump Tubing Green/Green Bridged **M025T002,** (**PS Analytical**: Arthur House, Crayfields Industrial Estate, Main Road, Orpington, Kent, BR5 3HP,UK; e-mail: psa@psanalytical.com, tel.: +44 1689 891211, fax: +44 1689 89609, www.psanalytical.com)	
10M	**53952** Soft ABBYY Lingvo 12 engl-rus, rus-engl **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
11M	**56516** Soft Kaspersky/Antivirus 7.0 **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
12M	**60613** Mouse Dell USB **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
13M	**59628** Converter CT-144 from USB to RS232 **Alsi innovation,** Kazakhstan, Almaty, tel +77272971140, fax +77272971141, www.alsi.kz	
14M	Certified reference material **RTC-CRM 025**, Soil (Sandi loam) - Metals www.lgcstandards.com	
15M	Certified reference material **RTC-CRM 026**, Soil (Sandy loam) - Metals www.lgcstandards.com	
16M	Certified reference material **U-IAA-280**, Hg in dilute HNO3, 1000 µg/mL www.lgcstandards.com	
17M	Certified reference material **NCS ZC76316**, Water - Mercury www.lgcstandards.com	

7. Questions, suggestions

no