

# Workshop at ANSA for Quality Control for Water Testing Laboratories

3rd-4th June 2014 at ANSA



## Why are we here?

**By: Dr. Stoveland**  
**Team leader, NORPLAN**

**Project in MRRD covering  
Capacity Building and  
Institutional Cooperation in the  
field of Hydrogeology for Faryab  
Province Afghanistan**





**QUALITY PROBLEM:** We discovered under our hydrogeological project that there were problems with the results when analysing samples in Kabul labs.

**Consequence:** We had to send samples abroad for analysis.

**Bad thing:** No quality control systems in place

**Good thing:** Trained staff and reasonable equipment in labs so remedy possible

# Our problem ( with our project)

- We could not trust the data and results from local labs.

( not possible to pick and choose which results to believe trust some results and not believe others..?)

- We have a problem and we need a solution - Quality Control system

# So why are we here

- **We want to aim at analysing all water samples in Afghanistan at local labs**
- **We want to trust the results**
- **HOW: by developing and establishing a Water Testing laboratory Quality Control system for Afghanistan under the ANSA**

# Key Definitions

**Quality Assurance (QA):** a **broad plan** for maintaining quality in all aspects of operations. It describes how the laboratory functions in terms of:

- laboratory purpose,
- documentation of all procedures,
- staff training,
- data management and reporting, and
- specific quality control measures.

**Quality Control (QC):**

consists of the steps taken to verify the validity of analytical procedures.

# Some examples of problems?

- Calibration of equipment?
- Certified training of staff to use equipment bought?
- Conservation of samples; stored cold ?
- How do you know where the samples come from?
- Anybody checking of the results have been correctly analysed?
- Have the lab staff checked against standards that the analytical method works?
- Registration of samples
- Standard reporting of results?



# Examples of sample conservation..

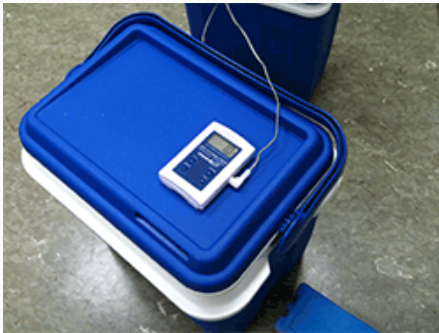


Inadequate storage facilities?

Temperature controlled storage required....



# Example of sample transportation in accredited system - international QC



Cooling elements,  
temperature measured  
in water  
bottle..

Sample coolbox

Thermometer: temp  
1-5 degrees





# Checking volume and weights




Balance need to read exactly 10.000 kg, and need adjustment

A balance must also be in level!  
Checked!!



# Checklist for analysis, Always register and sign . Action tracable

**KAPA**


<b>SJ_02010101: SJEKKLISTE FOR AUTOMATISK PRØVETAKING: UKE- DØGNBLANDEPRØVE, RENSEGRAD</b>		<b>Utgave</b> 9	<b>Gyldig fra:</b> 25.04.12	
<small>1:02_Gjennomførsel_prøvetaking\Sjekklister\SJ_02010101_Sjekkliste_for_automatisk_prøvetaking_uke_dognblendeprøve_rensgra_d_V_0_120425.docx</small>				

<b>RENSLEANLEGG:</b>		<b>Prøveserie nr. (og skjema nr.)</b> - PUB -		<b>Renseanlegg</b> <small>(INN-UT-UT)</small>	<b>Prøvetype</b> <small>(INN-UT-UT)</small>	<b>År</b> (2012)	<b>Uke slutt nr. (uag)</b>																		
<b>Ansvarlig for prøvetaking:</b>		<b>Tlf:</b>		<b>Start dato:</b>																					
<b>Kontroller ved prøvetaksperiodens start: (bekreftelse ved initialer i relevante ruter*)</b>																									
	<b>Innløp</b>	<b>Utløp</b>	<b>Kommentar</b>																						
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Slinger prøvetaker rengjort/hye																									
Prøvetaker rengjort																									
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<b>Parshall renner kontroll</b>	<b>Hovedmåler 1</b>		<b>Hovedmåler 2</b>		<b>Overløpsmåler</b>																				
Målt (cm) / avlest (m <sup>3</sup> )	til vannspeil cm:	m <sup>3</sup> tabell:	til vannspeil cm:	m <sup>3</sup> tabell:	til vannspeil cm:	m <sup>3</sup> tabell:																			
Avlest (m <sup>3</sup> )	Avlest (VM)	Data	Avlest (VM)	Data	Avlest (VM)	Data																			
Kontroll annen vannmåler overløp	Tidsmåler kontroll at denne aktiveres når føler kommer i kontakt med vann, ok?																								
<i>Under prøvetaking: bruk tabell på baksiden av dette arket(side2)</i>																									
<b>Døgnblendeprøve</b> <small>(Prøver KOF, BOF)</small>	<b>Start dato:</b>	<b>Slutt dato:</b>	<b>Flaske ID (inn):</b>	<b>Flaske ID (ut):</b>	<b>Sign:</b>																				
<b>Kontroller ved prøvetaksperiodens avslutning</b>																									
Kun tilfredsstillende rengjort utstyr ble brukt for håndtering av prøver / delprøver	Inn:	Ut:	<b>Kommentar:</b>																						
<b>Oppslutning, ukeblendeprøve</b>	<b>Dag1</b>	<b>Dag2</b>	<b>Dag3</b>	<b>Dag4</b>	<b>Dag5</b>	<b>Dag6</b>	<b>Dag7</b>																		
Innløp/ Utløp: Volum delprøve til 500 ml ukeblendeprøve (ml)							<b>Sum<sup>2)</sup></b>																		
<b>Flaske ID</b>	Inn:			Ut:																					
<b>Avvik rapporter i perioden (Avvik nr.)</b>																									
Prøvetaker signatur <small>(forskriftsmessig gjennomført)</small>	<b>Slutt dato:</b>	<b>Kladdemarkert brukt?</b> <small>(ja/nei)<sup>4)</sup></small>	<b>Sign:</b>																						

<sup>1)</sup> Ukenummeret basert på prøveseriens sluttuke.  
<sup>2)</sup> Ukeblendeprøve satt sammen volumproporsjonalt for uketilrenning. Bruk beregning i prosedyre PR-020108  
<sup>3)</sup> Her føres gjennomsnitt av 5 del-volum (test 1,2,3,4 og 5) fra prøvetaker målt for prøvestart.  
<sup>4)</sup> Kladdemarkert arkivert på renseanlegget

# Sample registration, Sample preservation method, and analysis to be done on samples

SJ_02020101: SJEKKLISTE FOR TILBEREDING AV FLASKER FRA LABORATORIUM BREDALSHOLMEN - MILJØGIFTER	Utgave 3	Gyldig fra 23.10.12	KAPA	
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I:\02\_Gjennomfører\_provetaking\Sjekkliste\SJ\_02020101\_Sjekkliste\_tilbereding\_av\_prøveflasker\_fra\_laboratorium\_Bredalsholmen\_V\_3\_121023.docx

Prøveflasker fra laboratorium:		Vannlaboratoriet i Kristiansand				Til renseanlegg:		Bredalsholmen					
Ansvarlig laborant (med blokkbokstaver):						Sign:		Dato:		Tlf.:			
Flaske ID Eks: BR - TS - INN - 1 - - 5 BR - TS - INN - uke (PR-020302)	Antall	Kvalitet		Volum		Konserveringsmetode (mengde i ml)			Rengjort i følge prosedyre			Sign (Lab)	Kommentar
		Plast	Glass	500 ml	1000 ml	H <sub>2</sub> SO <sub>4</sub> svovelsyre	HNO <sub>3</sub> salpetersyre	Annet		Prosedyre Nr?	Ny(e) flaske(r)?		
TUNGMETALLER													
BR - T-INN- 1 til 7	7												
BR - T-INN-05-.....	1												
BR - T-UT- 1 til 7	7												
BR - T-UT-06-.....	1												
BR - TS-INN- 1 til 5	5												
BR - TS-INN-07-.....	1												
BR - TS-UT- 1 til 5	5												
BR - TS-UT-08-.....	1												
ORGANISKE MILJØGIFTER													
BR - M-INN- 1 til 7	7												
BR - M-INN-09-.....	2												
BR - M-UT- 1 til 7	7												
BR - M-UT-10-.....	2												
BR - MS-INN- 1 til 5	5												
BR - MS-INN-11-.....	2												
BR - MS-UT- 1 til 5	5												
BR - M S-UT-12-.....	2												
Mottatt på renseanlegget		Antall prøveflasker mottatt:				Prøveflasker uskadet <sup>1</sup> :				Til prøveserie:			
Prøveflasker mottatt av (med blokkbokstaver):						Sign:				Dato:			

1) Er det noe galt med flaskene, skriver mottaker avvik, og returnerer hele serien



# So what can we do

- Prepare good procedures
- Prepare template checklists
- Prepare formats for reporting
- Prepare training and certification of analysis
- Follow defined and good practices , and document with agreed standards
- Routinely check standards, and joint inter- laboratory calibration
- Calibrate daily equipment
- Use only good chemicals etc.



# Two meetings with ANSA in February and May 2014:

We have agreed:

- **A QC for labs is needed for Afghanistan**
- **ANSA is the focal point.**
- **A consultative committee to be adviser for ANSA as government focal point**
- **Technical workgroups to develop documentation, program and plans and report to Consultative Committee of adaptation**

# Two meetings with ANSA in February and May 2014: cont.-

## Further agreements:

- Accreditation of labs not possible before earliest 2017
- National Classified laboratory standards needed
- QC system to be developed based on consensus where possible

# Two meetings with ANSA in February and May 2014: cont.-

## **Further agreements:**

- **Necessary to plan for short term, medium term and long term solutions**
- **A work to be held to prepare TOR and work plans for national framework as indicated in the diagrams to follow:**

# Agreed Members of Consultative Committee

- Focal point: ANSA
- Laboratory owners: MRRD, MoPH, MEW, AGS, DACAAR, VICC (Private sector labs), AUWSSC, Academia( Kabul University) MUDA,
- Supporting agencies: UNICEF, WHO, GIZ, Norplan, Others

# Different standards needed

## Possible Framework for Laboratory Quality Control/ Quality Assurance systems

Level	ISO Standard17025 Accreditation	National standards	Individual laboratory standards
International QC organisers	International ISO office		
National Level QC organisers 	One Accredited National, ISO office Approve, control all labs seeking accreditation.	Agreed national Lab QC system	
Laboratory owners (Public or private institutions)	Many public & private labs apply for accreditation	to be developed?	Lab QC system established for individual labs
Laboratory Supervisors	Lab. control staff signs that standards are followed		developed? all different??
Laboratory analysts/technicians	Lab. staff trained to follow approved procedures, standards		



ANSA

Potential Stakeholders QC/QA (and more)



MRRD



MOPH



MOM/ AFS



MEW



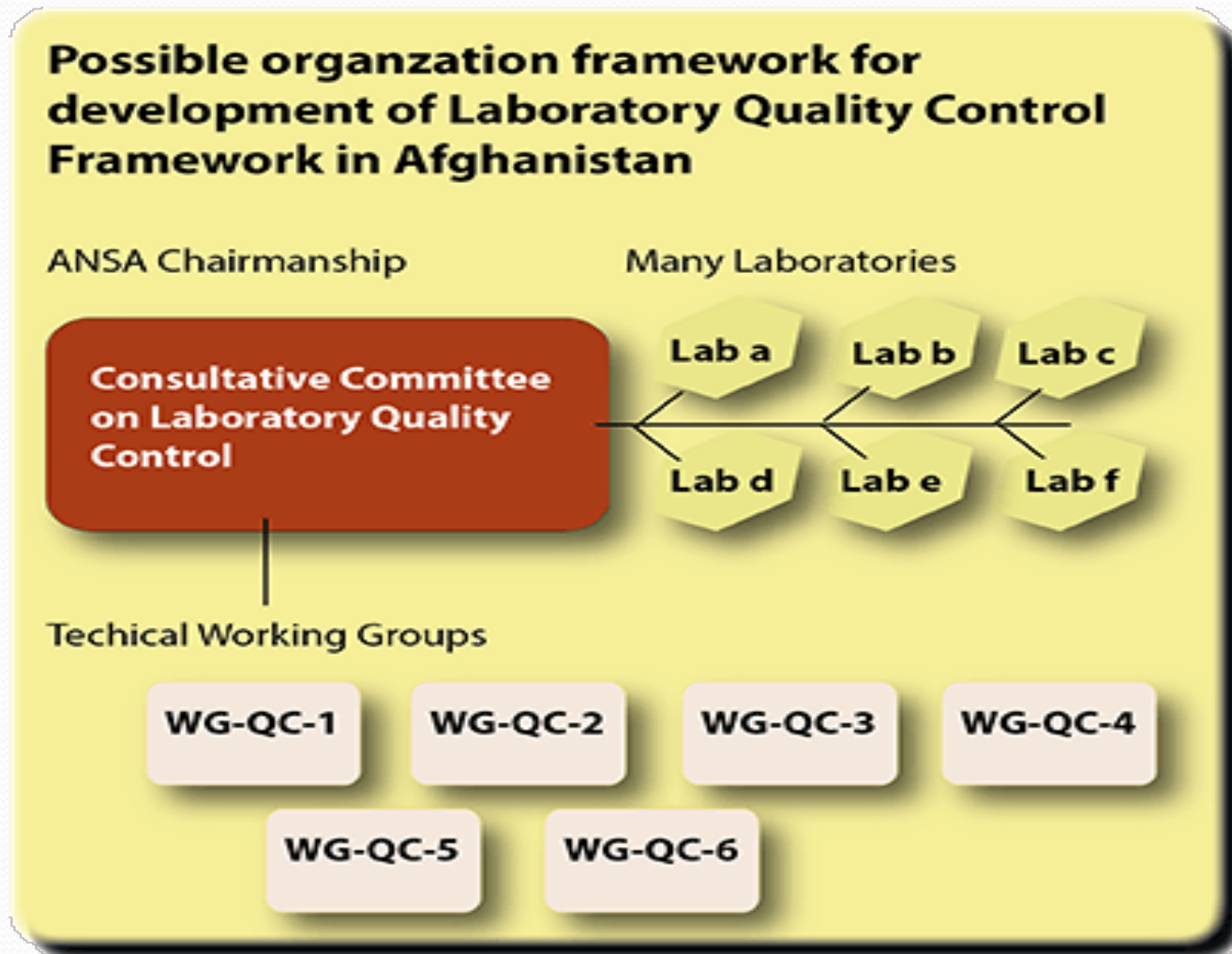
RuWatSIP



NGOs/ Firms



# Organogram for QC work



## SCHEDULE FOR QA AND QC DEVELOPMENT UNDER ANSA FOR AFGHAN WATER TESTING LABORATORIES

WL - QC committee

Intercalibration testing established

Certification system for AFG proposed( two classes?)

Standard reporting formats adapted

Afg. sampling and testing procedures a, dapted

Certified training framework apporved

QS proposed for 2- 3 category levels of labs

National certification of laboratories

AFG. Accreditation office

Accreditation of AFG laboratories

*DRAFT FOR  
DISCUSSION*

2014

2015

2016

2017

# Scheduled activities ( in diagram)

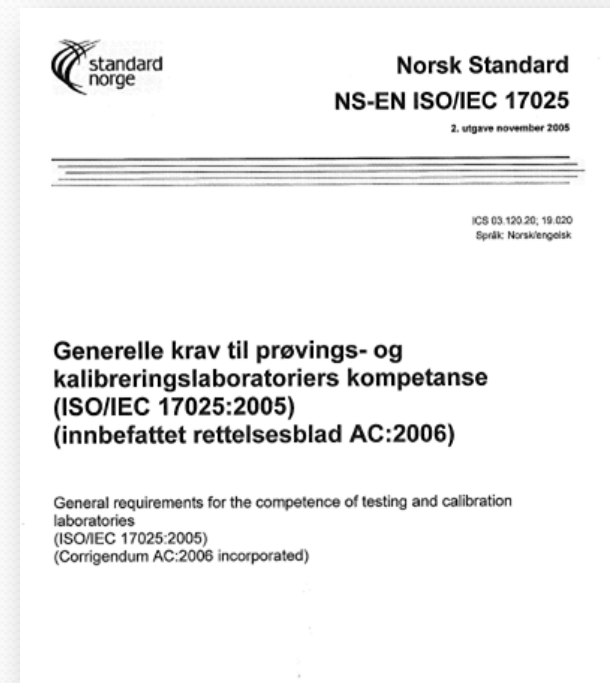
Discussed and tentatively approved:

- WL Consultative committee established mid 2014
- Inter-calibration testing to be established autumn 14
- Standard reporting formats adapted mid 2014
- Certified training framework approved early 2015
- QC for 2-3 National Lab Class categories established by late 2015
- National certification of laboratories ( Afghan standards from late 2015 onwards
- AFG accreditation office established , mid 2016
- Accreditation of laboratories in Afghanistan from 2017y

# Our dream

- Many laboratories accredited in the future
- All laboratories registered in
- National QC Classification system

**ISO/IEC 17025:2005**  
**General requirements for**  
**the competence of testing**  
**and calibration**  
**laboratories**





THANK YOU





# Example of how important it is to have trustworthy results –

Example Fluoride measurements Faryab:

- Hydrogeology project
- UNICEF Fluoride map.

# Hydrogeology project: 132 samples analyzed by BGS, UK

## Fluoride

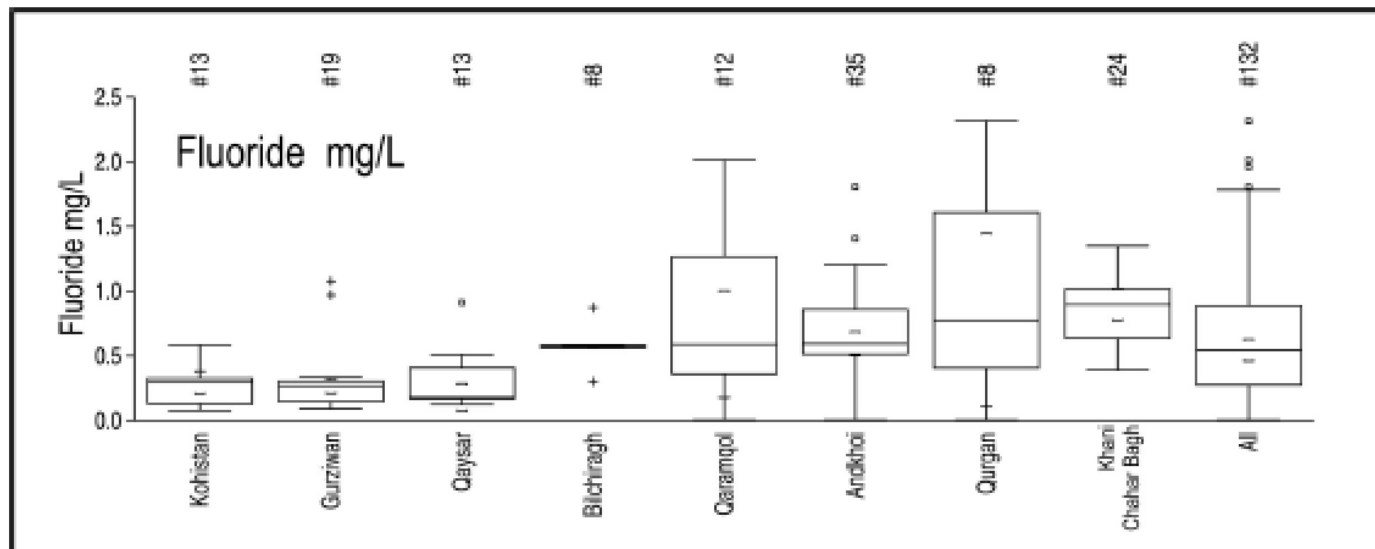
EC 1998 Directive: < 1.5 mg/L

WHO (2011): Guideline < 1.5 mg/L

25-percentile in Faryab = 0.3 mg/L (N=127 samples above dl)

50-percentile in Faryab = 0.56 mg/L (N=127 samples above dl)

90-percentile in Faryab = 1.13 mg/L (N=127 samples above dl)



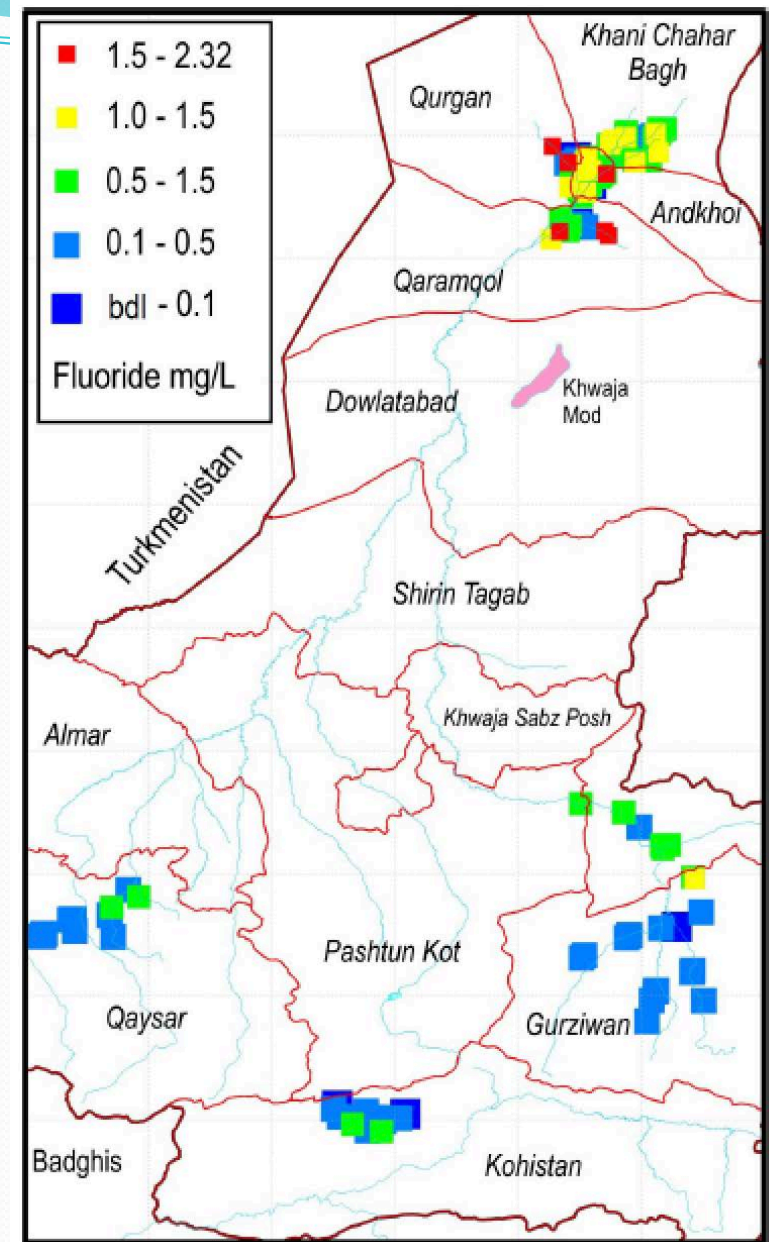
# Hydrogeology project: 132 samples analyzed by BGS, UK

Conclusion:

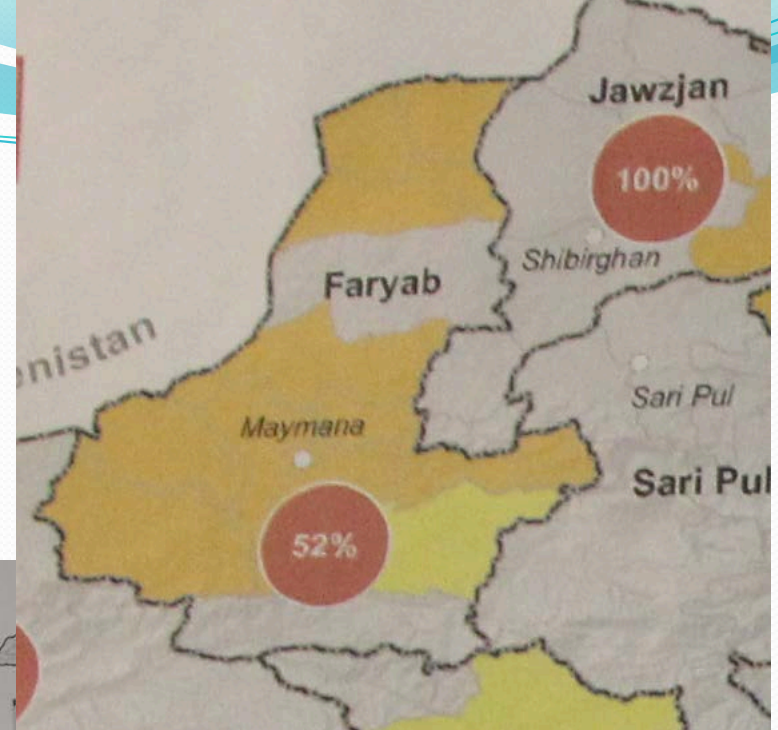
No serious problem.

EU safe < 1.5 mg/l

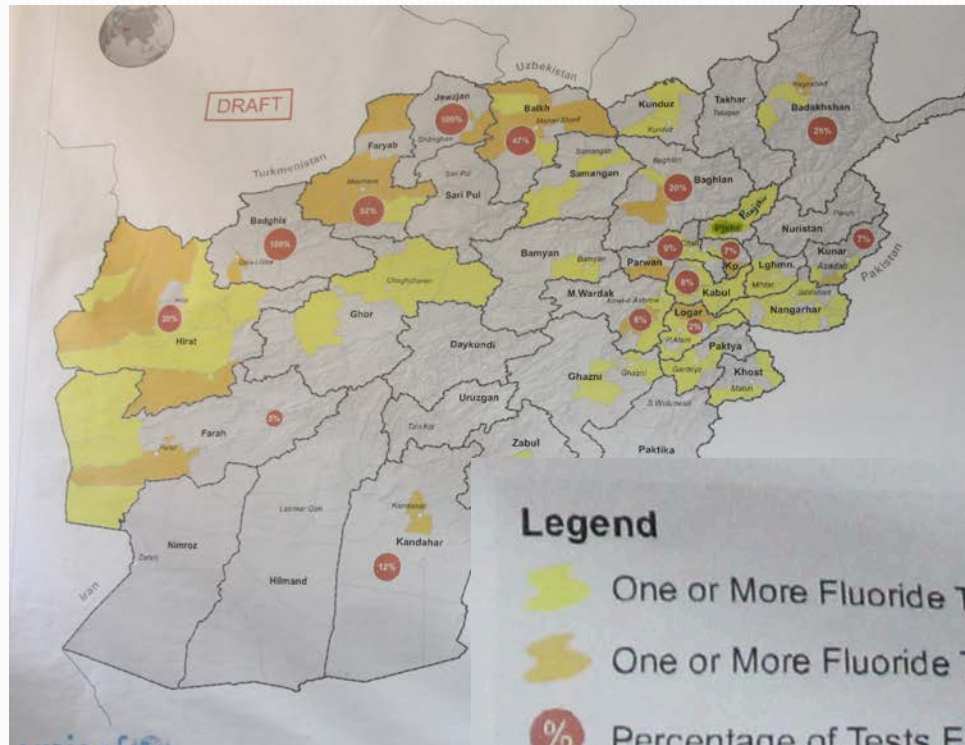
**All seems well!**



# UNICEF Fluoride map:



		(mg/L)	1.5mg/L
Badkhashan	4	1.45	1
Badghis	5	11	5
Baghlan	5	1.5	1
Balkh	30	40	14
Bamyan	4	0.92	
Farah	44	1.5	2
Faryab	105	40	55
Ghazni	92	1.01	
Ghor	17	1.3	
Herat	30	12.6	6
Jawzjan	2	25.0	2
Kabul	87	5.2	7
Kandahar	17	2.55	3
Kapisa	15	1.8	1
Khost	12	0.9	
Kunar	14	1.45	1
Kunduz	7	1.35	
Laghman	10	1.20	
Logar	42	1.45	1
Maydan Wardak	13	1.6	1



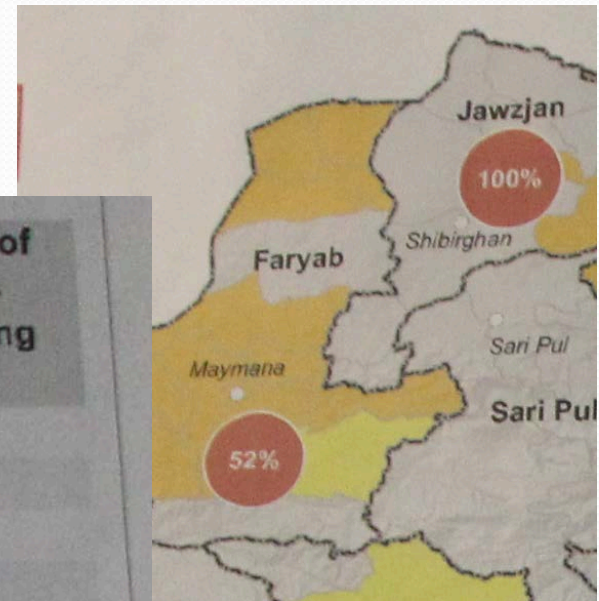
## Legend

- One or More Fluoride Tests have been Conducted (by District)
- One or More Fluoride Test Results have Exceeded Limit (by District)
- Percentage of Tests Exceeding Limit (by Province)



# UNICEF: Fluoride map:

Province	Number of Samples	Highest Test Result (mg/L)	Number of Samples Exceeding 1.5mg/L
Badakhshan	4	1.45	1
Badghis	5	11	5
Baghlan	5	1.5	1
Balkh	30	40	14
Bamyan	4	0.92	
Farah	44	1.5	2
Faryab	105	40	55
Ghazni	92	1.01	



Conclusion: 52 % over safe limit

**Situation serious/ Bad**

Highest concentration 40 mg/l

## Legend

- One or More Fluoride Tests have been Conducted (by District)
- One or More Fluoride Test Results have Exceeded Limit (by District)
- Percentage of Tests Exceeding Limit (by Province)




When giving advise of serious implications we need to trust the data.

We need a QC to give confidence in the results. Lets find this system together



# Many add fluoride to drinking water at 0.7 to 1.2 mg/l



**Fluoride  
Information  
Network**

Home

Fluoride ▶

Top Ten Facts

Kids & Fluoride ▶

Safety

F.A.Q.s

## ***Fluoride.***

### ***Water Fluoridation***

**Why We Add Fluoride to Water:**  
The natural fluoride in a community's water supply sometimes is not at the optimal level to prevent tooth decay and so we have to adjust it for the greatest benefit to all. The acceptable level ranges from 0.7 – 1.2 parts fluoride to one million parts water.

Over 300 million people in more than 40 countries worldwide enjoy the benefits of fluoridated water. In the United States, approximately 145 million people in more than 10,000 communities benefit from drinking fluoridated water.