Sultanate of Oman

The Ministry of Education

South Eastern Province

Al Rifaa basic School 5-10

Study the effectiveness of using pottery in improving the quality of natural drinking water

Done by :

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Sultanate of Oman - South Eastern Province

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Contents

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Abstract:

We wondered whether pottery actually had an impact on drinking water .Also many articles mentioned importance of drinking alkaline water, and that" it is the most suitable for the human body we also wondered (Does pottery affect the pH of water?) . In order to identify the effects of pottery pots on drinking water, we use GLOBE hydrology protocols (temperature. Salinity, electrical conductivity and pH) of five natural samples from different wells before they were placed in and after pottery container . We found that the natural water readings changed after they were placed in the pottery container . The most noticeable thing is the increase thet happened in the PH) We made sure of the result in collaboration with the technical lab Mrs . Tahani Mohammed AlMeshiki Laboratory Technician in the WATER QUALITY DEPARTMENT, and we came through our experience and confirmatory experience that the water in pottery containers is not as it is outside.

We concluded that the pottery affects the quality of the water , the pH became high enough for the human body and it cools the water.

We recommend to return to using pottery to save water, so we will drink water with a suitable pH number for our bodies and cool, while minimizing the economic value of chemical treatment of water and cooling.

Key words :

Drinking Water: water that human use without causing health problems.

PH: The measurement that determines whether the fluid is acidic, alkaline or neutral.

Pottery: A solid material produced by grilling the clay with ovens after forming.

Research questions:

1. **How do pottery affect the qualities of natural drinking water؟**

2. **What is the effect of pottery on water pH؟**

Introduction and literature review:

According to WHO statistics "In 2015, there are 844 million people in this world who do not have safe drinking water"

Ahmad al-Harbi in Al-Sharq newspaper in an article entitled "Bottled Water and its Risk to Our Health." said "Plastic bottles made of materials interact with Water at a certain temperature between 15-20 degrees Celsius. In our summer temperatures reach more than forty degrees Celsius and water trucks circulate our streets in the summer loaded with water bottled in plastic bottles, and this in itself is a risk that is feared to be exacerbated. " as this article shows the risk of using plastic bottles there is a project has been done "the Water and Health Project" in the province of Limpopo South Africa in 2010 . the citizens found effective results in water purification and the design was easy and practical.

Perhaps instead of all these things we should go back and use the wisdom of parents and grandparents . As pottery industry is popular in the Sultanate of Oman and also conservation of water in pottery has a positive impact on the quality of drinking water, as we found through this study, so we can in Oman get the global most desirable alkaline water that regulates metabolism and helps to support the immunity of the body and decrease the resistance to cancer and has properties of disinfectant of the colon.

search methods:

First: Research Plan:

In order to answer the research questions we first search for the theoretical information related to the effect of pottery on the water and then we conducted two experiments:

- **The first experiment (aims to find out water qualities are affected by its conservation in pottery):**

Tools: Pottery - Five samples of water from different wells - thermometer - PH scale - conductivity and salinity meter

Steps :

-Take water sample data (temperature - conductivity - salinity – pH).

-Enter Data in the GLOBE website

-Put the water in the pottery container for a full day

-Take the water data again after placing it in the container

-Repeat steps for the rest of the samples

- **The second experiment (aiming to ascertain the effect of conserving water in pottery for several days on the pH in particular:)**

Tools: Pottery - a sample of water well - thermometer - PH scale - conductivity and salinity meter

Steps :

-Take water sample data (temperature - conductivity - salinity - pH.(

-enter Data in the GLOBE website

-Put water in pottery container .

-Take the water data again after putting it in the pot for several consecutive days.

And then an interview with Mr. Abdulla bin Salem Al-Ghailani, water desalination specialist from the General Authority for Water and Electricity and showing him the results.






Second: Study Location:

The study site (Sultanate of Oman, South Eastern Province), Jalan Bani Hassan, moderate atmosphere (28-30) C , hydrology protocols .

Sites of samples of the first experiment (Jalan Bani Bani Hassan

Sample site of the second experiment (Alkamil wal Wafi)

Results:

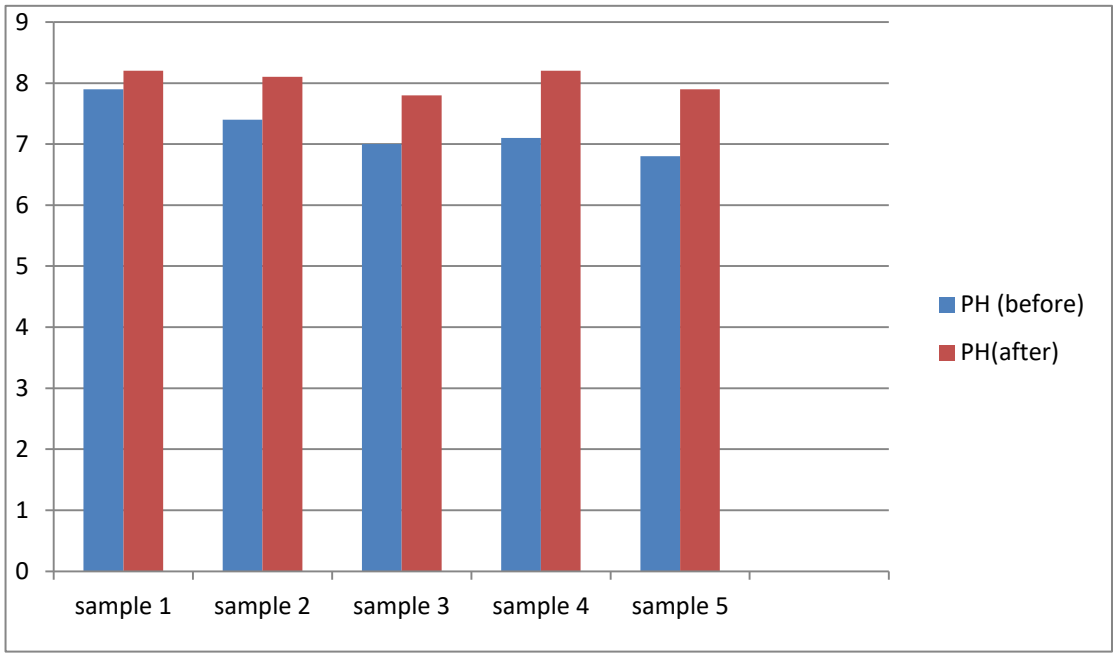
(The first experiment)

Results of the properties of natural drinking water before and after placing it in pottery within 24 hours:

SAMPLES	DATA	BEFORE	AFTER
Sample)1(	PH	7,9	8,2
	T.D.S	1285	1322
	TEMP	28	23
	ELECTRICAL CONDUCTIVITY	1930	1977
Sample (2)	PH	7,4	8,1
	T.D.S	1254	1257
	TEMP	28	21
	ELECTRICAL CONDUCTIVITY	1930	1938
Sample 3	PH	7	7,8
	T.D.S	1638	2366
	TEMP	30	21
	ELECTRICAL CONDUCTIVITY	1520	1640
Sample 4	PH	7,1	8,2
	T.D.S	152.5	151
	TEMP	30	22
	ELECTRICAL CONDUCTIVITY	234	236

Sample 5	PH	6,8	7,9
	T.D.S	138	273
	TEMP	27	20
	ELECTRICAL CONDUCTIVITY	212	421

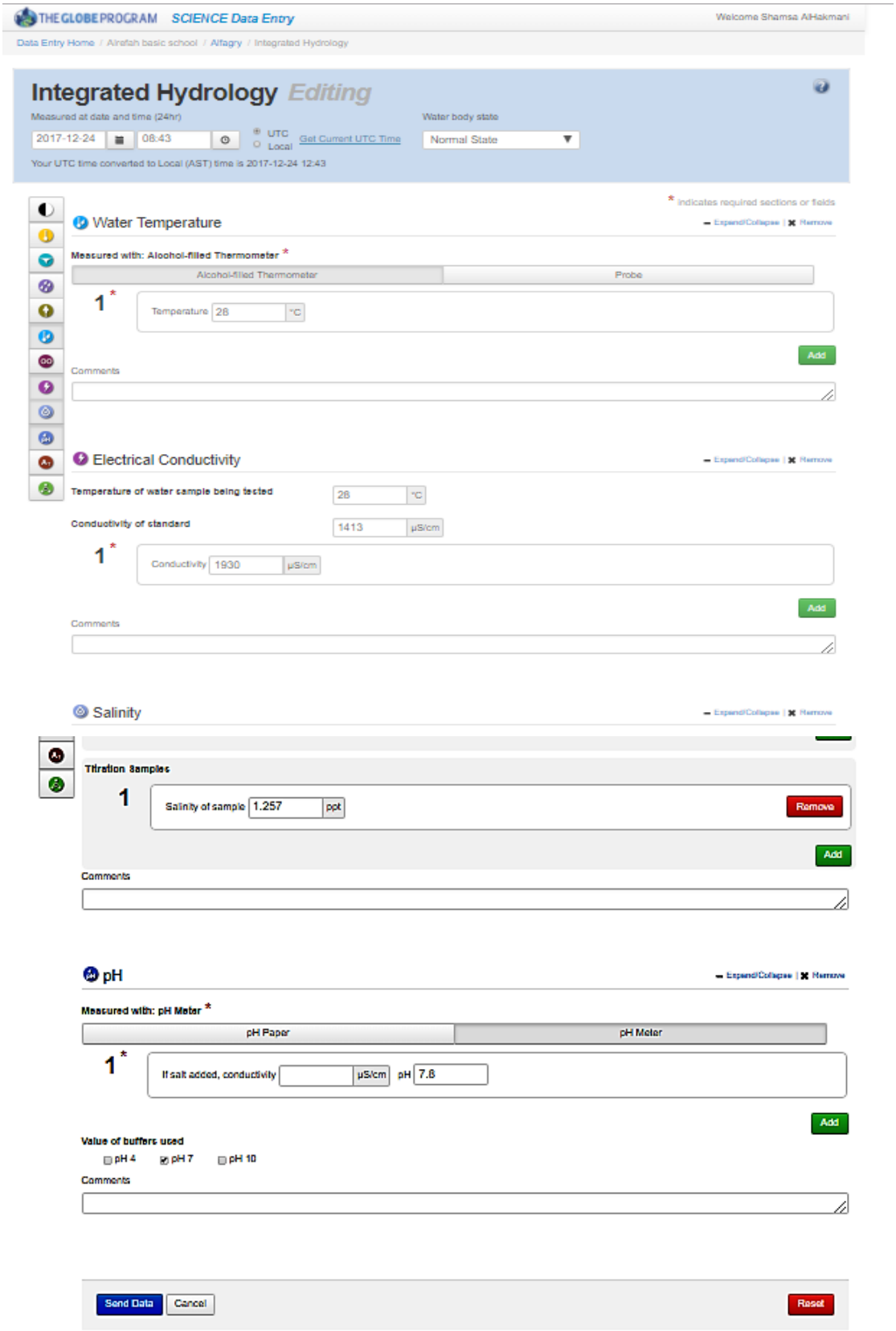
Table (1) Results of Sampling Before and After Pottery (First Experiment)



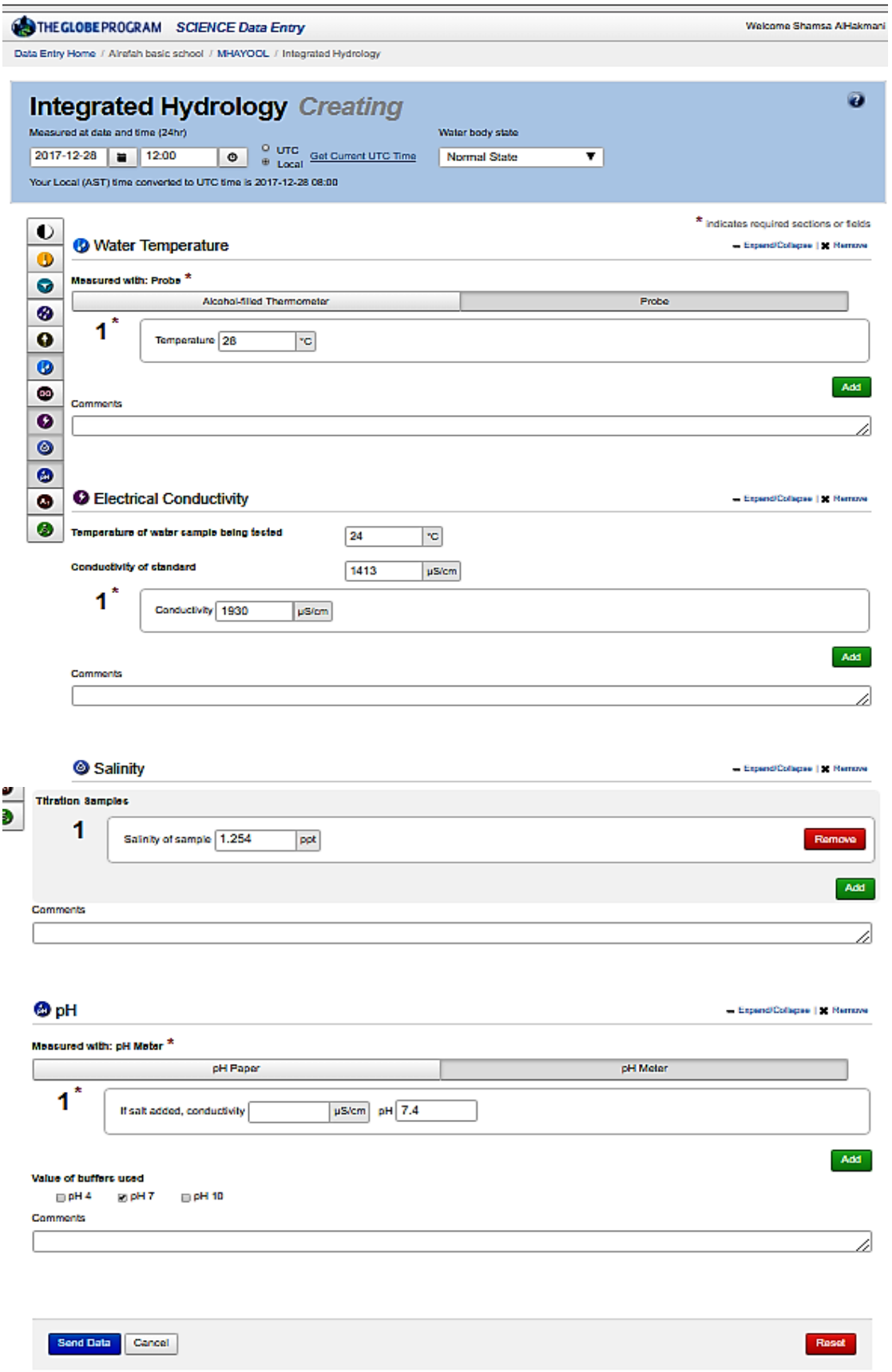
DATA TI	*PH*	*CONDUCTI*	*T.D.S*
BEFOR	*7.95*	*882.00*	*573.3*
1st day	*8.09*	*898.00*	*583.7*
2nd day	*8.46*	*913.00*	*593.45*
3ed day	*8.72*	*919.00*	*598.2*
4th day	*8.78*	*922.00*	*560.0*

Table (2) Results of pH after placing in a pot for consecutive days (second experiment

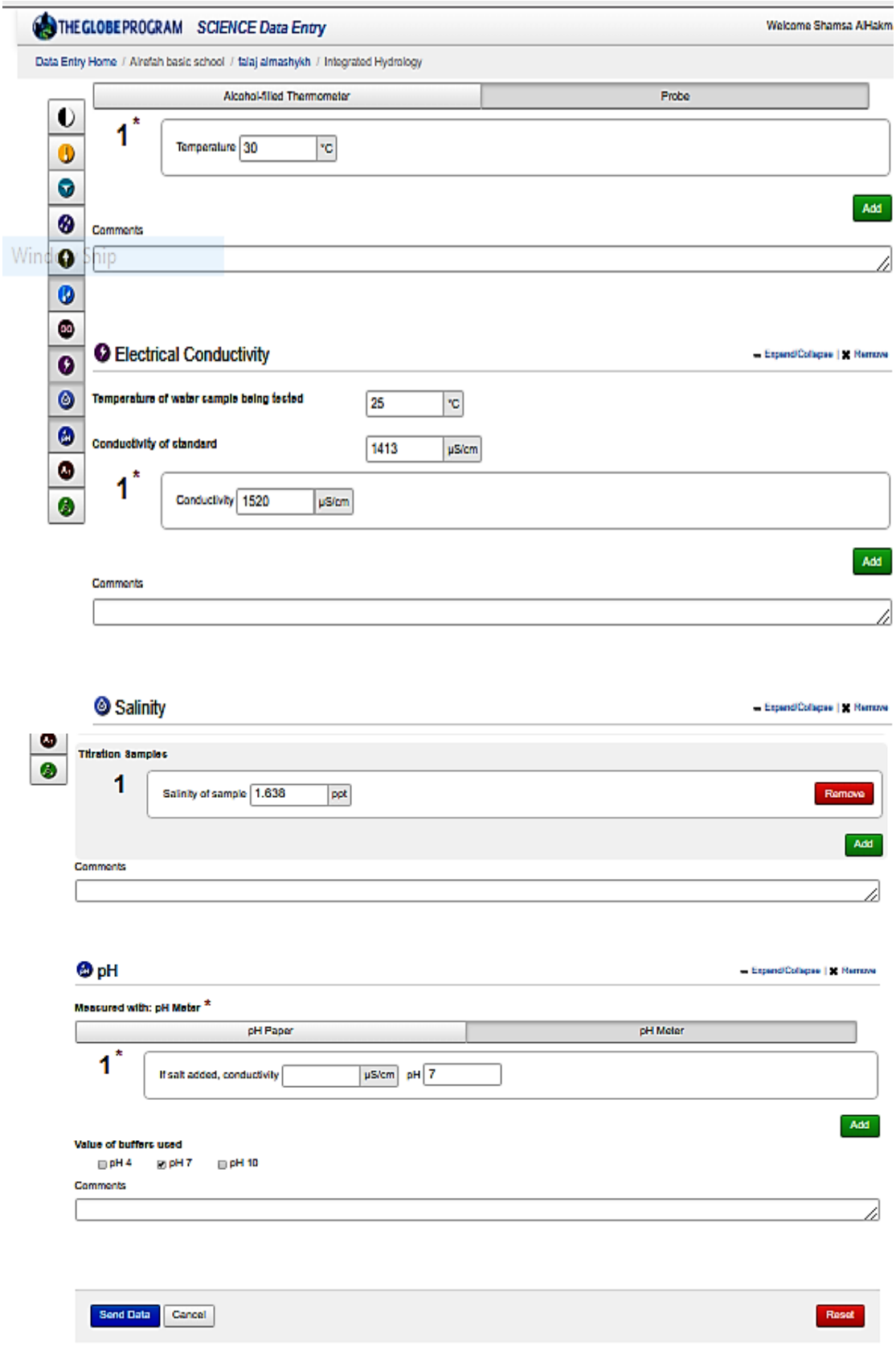
(Data entry forms at the GLOBE site)



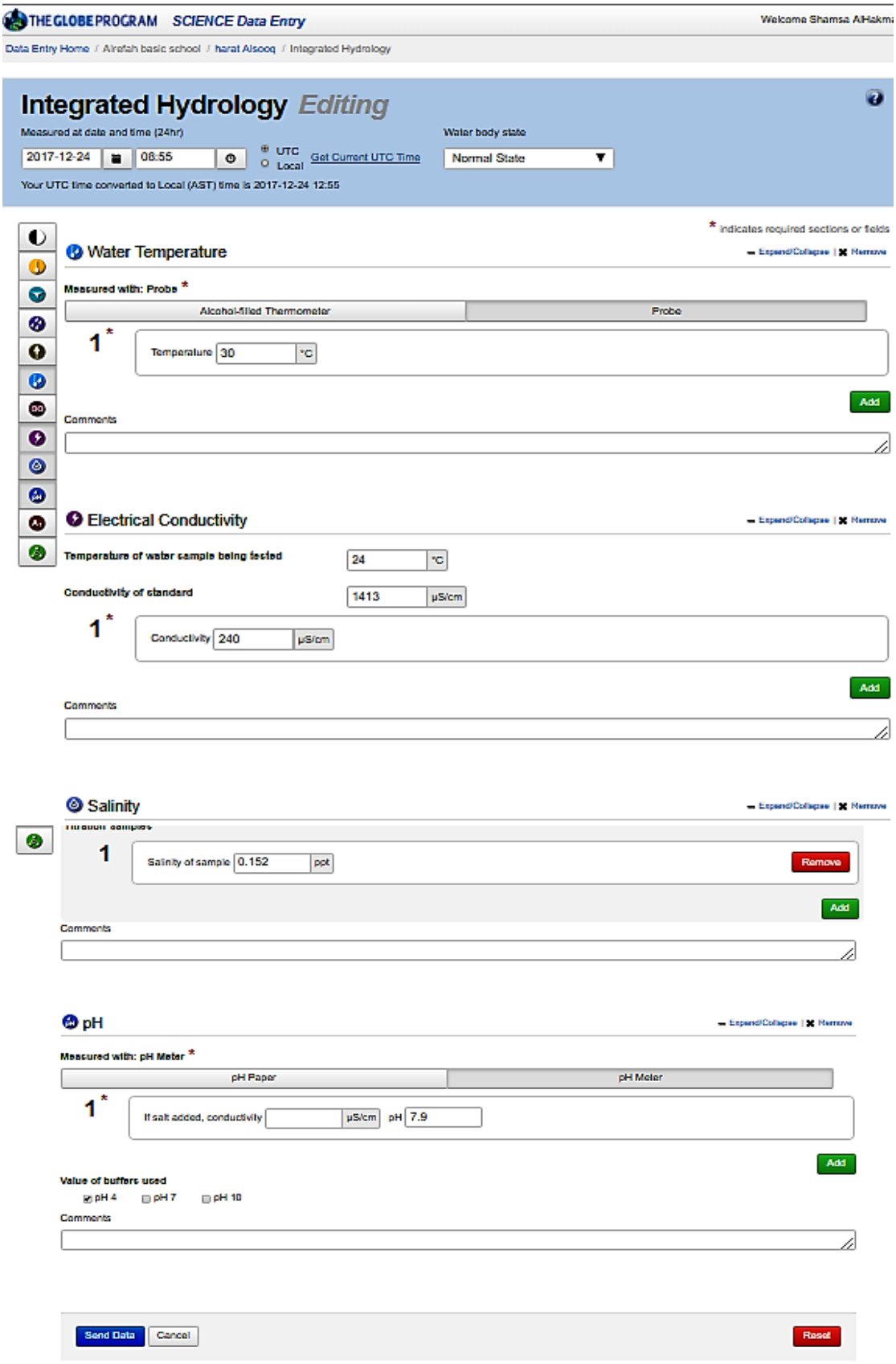
Sample 1


THE GLOBE PROGRAM SCIENCE Data Entry
Welcome Shamsa AlHakmani
Data Entry Home / Alrefah basic school / MHAYOOL / Integrated Hydrology
Integrated Hydrology Creating
Measured at date and time (24hr)
2017-12-28
12:00
UTC
Local
Get Current UTC Time
Your Local (AST) time converted to UTC time is 2017-12-28 08:00
Water body state
Normal State
* indicates required sections or fields
Water Temperature
Expand/Collapse | Remove
Measured with: Probe *
Alcohol-filled Thermometer
Probe
1 *
Temperature 26 °C
Add
Comments
Electrical Conductivity
Expand/Collapse | Remove
Temperature of water sample being tested 24 °C
Conductivity of standard 1413 µS/cm
1 *
Conductivity 1930 µS/cm
Add
Comments
Salinity
Expand/Collapse | Remove
Titration Samples
1
Salinity of sample 1.254 ppt
Remove
Add
Comments
pH
Expand/Collapse | Remove
Measured with: pH Meter *
pH Paper
pH Meter
1 *
If salt added, conductivity µS/cm pH 7.4
Add
Value of buffers used
pH 4
pH 7
pH 10
Comments
Send Data
Cancel
Reset

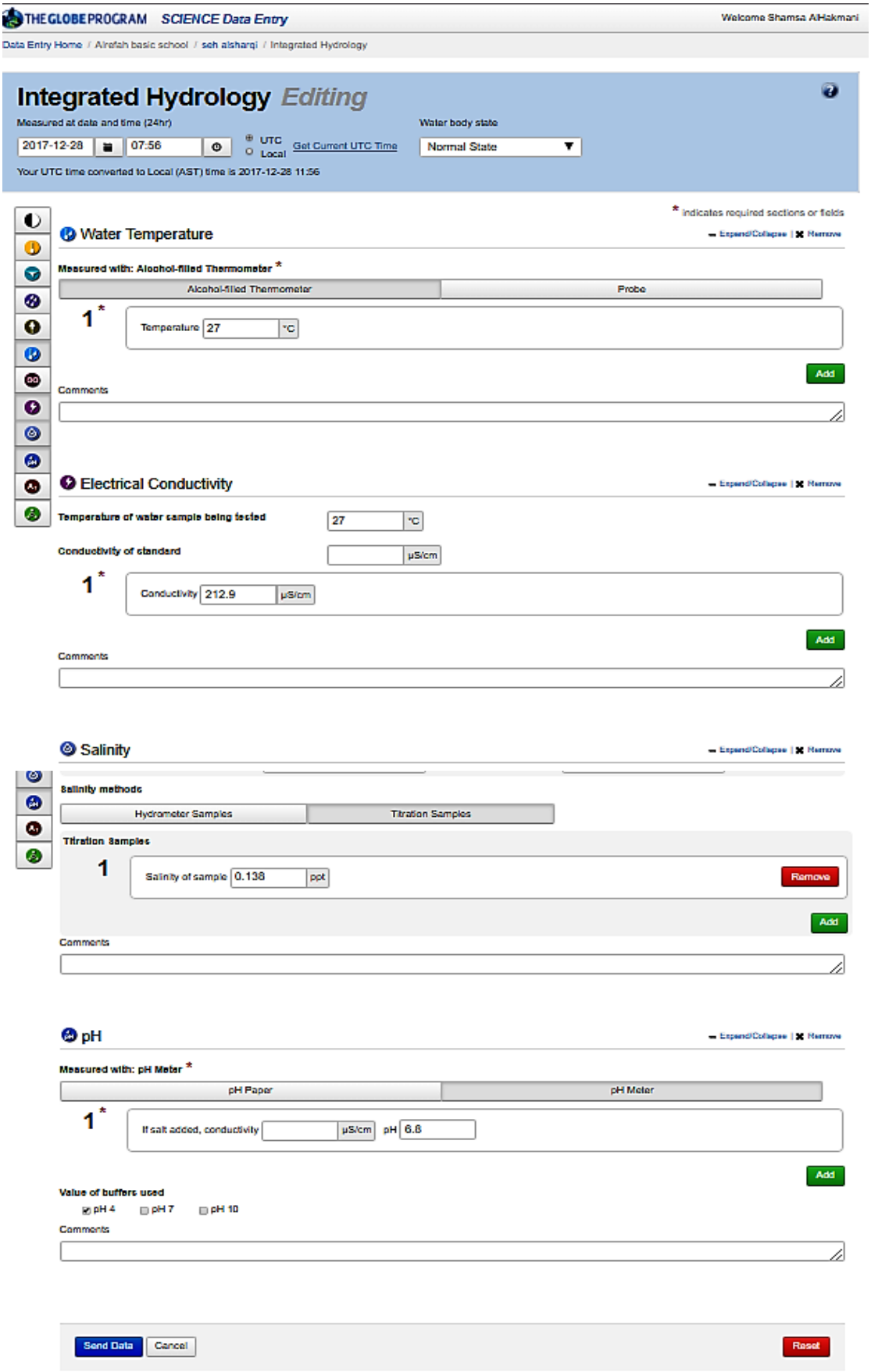
Sample 2


THE GLOBE PROGRAM SCIENCE Data Entry
Welcome Shamsa AlHakm
Data Entry Home / Alrefah basic school / talaj almashykh / Integrated Hydrology
Alcohol-filled Thermometer
Probe
1 *
Temperature 30 °C
Add
Comments
Electrical Conductivity
Expand/Collapse | Remove
Temperature of water sample being tested 25 °C
Conductivity of standard 1413 µS/cm
1 *
Conductivity 1520 µS/cm
Add
Comments
Salinity
Expand/Collapse | Remove
Titration Samples
1
Salinity of sample 1.638 ppt
Remove
Add
Comments
pH
Expand/Collapse | Remove
Measured with: pH Meter *
pH Paper
pH Meter
1 *
If salt added, conductivity µS/cm pH 7
Add
Value of buffers used
pH 4
pH 7
pH 10
Comments
Send Data
Cancel
Reset

Sample 3


THE GLOBE PROGRAM SCIENCE Data Entry
Welcome Shamsa AlHakm
Data Entry Home / Alrefah basic school / harat Alsooq / Integrated Hydrology
Integrated Hydrology Editing
Measured at date and time (24hr)
2017-12-24
08:55
UTC
Local
Get Current UTC Time
Water body state
Normal State
Your UTC time converted to Local (AST) time is 2017-12-24 12:55
* indicates required sections or fields
Water Temperature
Expand/Collapse | Remove
Measured with: Probe *
Alcohol-filled Thermometer
Probe
1 *
Temperature 30 °C
Add
Comments
Electrical Conductivity
Temperature of water sample being tested 24 °C
Conductivity of standard 1413 µS/cm
1 *
Conductivity 240 µS/cm
Add
Comments
Salinity
1
Salinity of sample 0.152 ppt
Remove
Add
Comments
pH
Measured with: pH Meter *
pH Paper
pH Meter
1 *
If salt added, conductivity µS/cm pH 7.9
Add
Value of buffers used
pH 4
pH 7
pH 10
Comments
Send Data
Cancel
Reset

Sample 4


THE GLOBE PROGRAM SCIENCE Data Entry
Welcome Shamsa AlHakmani
Data Entry Home / Alrefah basic school / seh alsharqi / Integrated Hydrology
Integrated Hydrology Editing
Measured at date and time (24hr)
2017-12-28
07:56
UTC
Local
Get Current UTC Time
Water body state
Normal State
Your UTC time converted to Local (AST) time is 2017-12-28 11:56
* indicates required sections or fields
Water Temperature
Expand/Collapse | Remove
Measured with: Alcohol-filled Thermometer *
Alcohol-filled Thermometer
Probe
1 *
Temperature 27 °C
Add
Comments
Electrical Conductivity
Expand/Collapse | Remove
Temperature of water sample being tested 27 °C
Conductivity of standard µS/cm
1 *
Conductivity 212.9 µS/cm
Add
Comments
Salinity
Expand/Collapse | Remove
Salinity methods
Hydrometer Samples
Titration Samples
Titration Samples
1
Salinity of sample 0.138 ppt
Remove
Add
Comments
pH
Expand/Collapse | Remove
Measured with: pH Meter *
pH Paper
pH Meter
1 *
If salt added, conductivity µS/cm pH 6.8
Add
Value of buffers used
pH 4
pH 7
pH 10
Comments
Send Data
Cancel
Reset

Sample 5

Discussion of results:

- **In order to answer the first question, it is clear from Table (1) that the water measurements have changed after being placed in the pottery container . the temperature has decreased and the conductivity and the T.D.S have increased. Indicating that pottery affects the qualities of natural drinking water. While presenting the results to Mr. Abdullah Al-Ghailani, he said: "Through the results that your experiment shows that pottery works to increase the pH of water and increase the content of salts and these qualities of the water after conservation in pottery is the most appropriate for the human body"**

- **To answer the second question, it is clear from schema 2 that there is a change in pH .it has increased after conservation in pottery. Table (2) shows the pH of the water and it's indicating that the water after placing it in the pottery increases its alkalinity.**

A study was conducted during the year 2016 on (100) people showed clear differences in blood viscosity after the use of alkaline water compared to normal water after exercise. The blood viscosity of people who used alkaline water was 6.3% and 3.36% for people who used standard drinking water, indicating that people who used alkaline water would have blood with a suitable viscosity that would provide more oxygen to the body.

Conclusion:

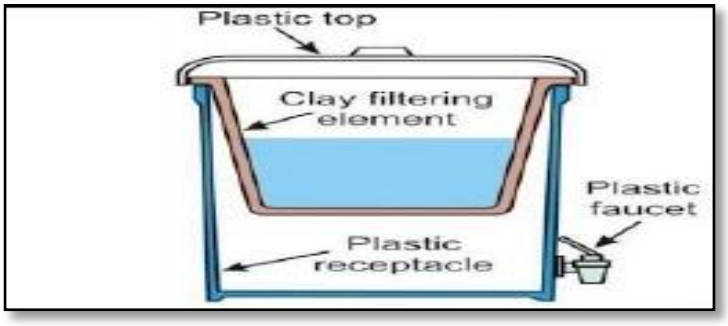
Through our application of the salinity, conductivity and pH measurement of samples of water wells before and after they were stored in a pottery vessel and monitored for several days, we concluded that the pottery affects the quality of the natural water and its validity so that the pH is high enough for the human body . the mineral salts have increased and also the electrical conductivity, while we can not get this feature when using plastic container .

•Recommendations:

-The research can be applied in different ways to confirm and prove the importance of water conserved in pottery to the health of the individual and we can add some of the GLOBE protocols such as dissolved oxygen protocol.

- wecan make a Research based on the effect of pottery on the conductivity of water and the effect of water conductivity on the human body.

-Implementing this design for the pottery filter in our community to provide us with pure cold water then perhaps we will be able to decrease the economic value of water treatment and cooling.



Suggested design for pottery filter

The strengths of the study : our findings, the use of the hydrology protocol, and weaknesses of the studr : lack of

information resources and previous local studies in the same topic .

Thanks and appreciation:

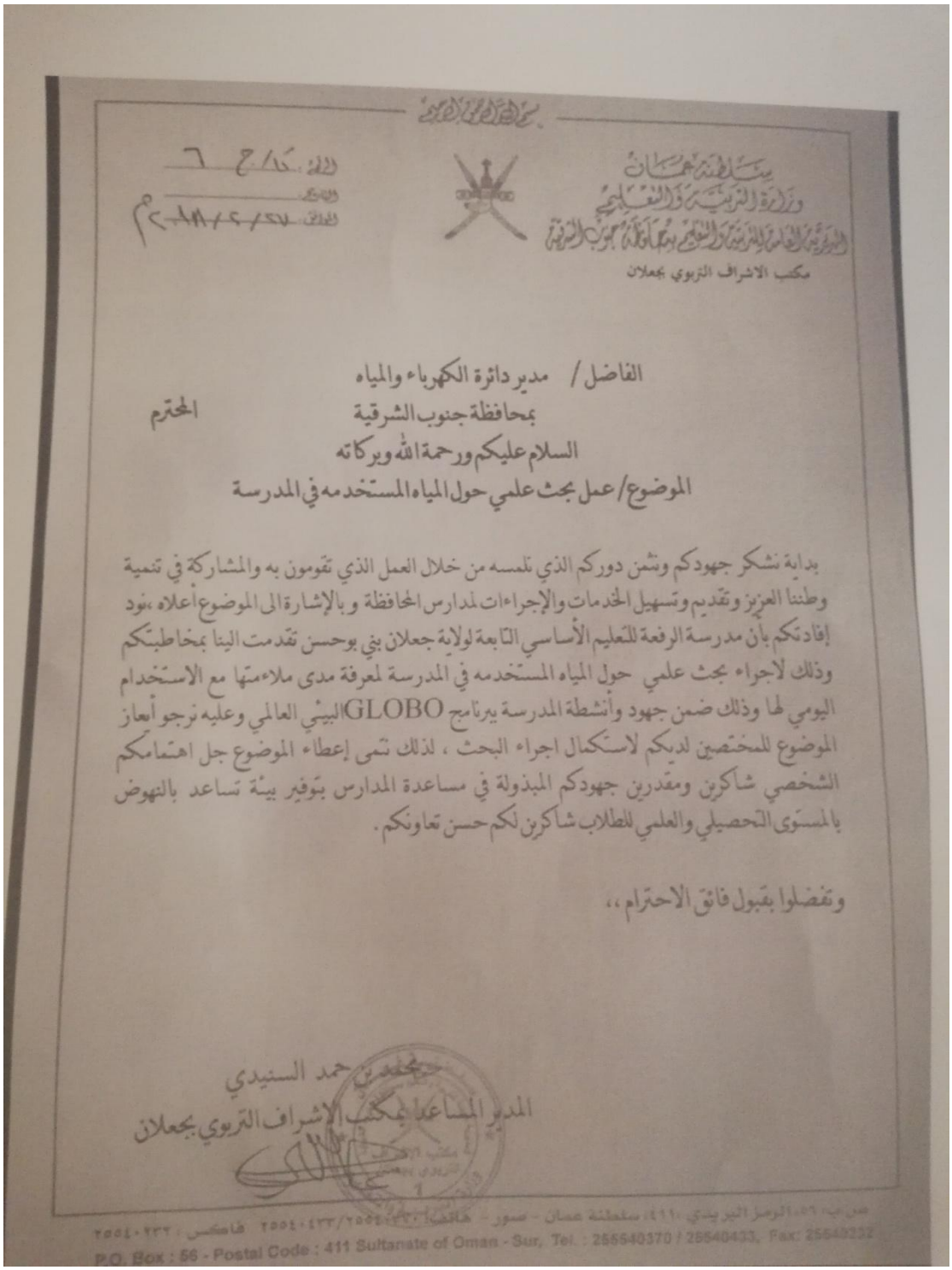
We are pleased to extend our sincere thanks and appreciation to Mrs . Shamsa Bint Khalifa Al-Hakamaniah, Globe Supervisor at Al-Rifaa School for Basic Education for her support , conducting and supervising this research, Mr. Abdullah Bin Salem Al-Ghailani, Water Desalination Specialist at the General Authority for Water and Electricity ,Mrs. Tahani Bint Mohammed Al - Mashaykhia laboratory Laboratory technician in the WATER QUALITY DEPARTMENT,. We also offer our sincere thanks to Mona Mohsen Al Rajhiya, Principal of the School and Professor Fawzia Khalfan Al-Rasabi, Supervisor of Biology and Professor Siham Al-Husaynah, Chemistry Teacher for their role in providing scientific and knowledge advice and research regarding research and development.

References:

1. **Al-Balushi, Asma Salem (2013). Introduction to the Water Protocol. Sultanate of Oman: Ministry of Education**
2. **Alsaree, Munther (August 19, 2014). The easiest and cheapest way to clean drinking water. Retrieved on December 22, 2017 from https://montheralsorayayye.wordpress.com**
3. **Msheela, Fatima. (2016, Aug. 30). Benefits of zeer water. Retrieved on December 22, 2017 from http://mawdoo3.com/%D9%81%D9%88%D8%A7%D8%A6%D8%AF_%D9%85%D8%A7%D8%A1_%D8%A7%D9%84%D8%B2%D9%8A%D8%B1**
4. **GOLDMAN, RENA. (2017, JULY 13). Alkaline Water: Benefits and Risks. Retrieved January 28, 2018 from https://www.healthline.com/health/food-nutrition/alkaline-water-benefits-risks#takeaway**

Annex (1)

Message of the Directorate General of Education in the South Governorate of the General Authority for Water and Electricity



سلطنة عمان
وزارة التربية والتعليم
مكتب الاشراف التربوي بجعلان

الفاضل / مدير دائرة الكهرباء والمياه
بمحافظة جنوب الشرقية
المحترم

السلام عليكم ورحمة الله وبركاته

الموضوع/ عمل بحث علمي حول المياه المستخدمه في المدرسة

بداية نشكر جهودكم وثمن دوركم الذي نلمسه من خلال العمل الذي تقومون به والمشاركة في تنمية وطننا العزيز وتقديم وتسهيل الخدمات والإجراءات لمدارس المحافظة و بالإشارة الى الموضوع اعلاه ،نود إفادتكم بأن مدرسة الرفعة للتعليم الأساسي التابعة لولاية جعلان بني بوحسن تقدمت الينا بمخاطبتكم وذلك لاجراء بحث علمي حول المياه المستخدمه في المدرسة لمعرفة مدى ملاءمتها مع الاستخدام اليومي لها وذلك ضمن جهود وأنشطة المدرسة ببرنامج GLOBO البيئي العالمي وعليه نرجو أبعاز الموضوع للمختصين لديكم لاستكمال اجراء البحث ، لذلك نتمى إعطاء الموضوع جل اهتمامكم الشخصي شاكرين ومقدرين جهودكم المبذولة في مساعدة المدارس بتوفير بيئة تساعد بالنهوض بالمستوى التحصيلي والعلمي للطلاب شاكرين لكم حسن تعاونكم.

وتفضلوا بقبول فائق الاحترام،،

محمد بن حمد السنيدي
المدير المساعد بمكتب الاشراف التربوي بجعلان

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