Research Report Bio-Sand Nadi Filter Water unit



Report Presented by:

Association for Humanitarian Development (AHD)



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1. Introduction of AHD Nadi Filter Project

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Association for Humanitarian Development (AHD) is a non governmental organization established in December 2001, with the major objective to work for peace, justice, harmony, and equality through participation of the most disadvantaged and marginalized communities for the sustainability. AHD has initiated several livelihood and development programs by targeting rural women. The major accomplishment in this regard, is the introduction of Bio-Sand Water Filter (BSF) / Nadi Filter in 32 vulnerable villages in costal areas (Jati & Sujawal) to improve access of poorest communities to safe drinking water. AHD's BSF Project is known as Nadi Filter (local name), because Nadi (a mud pot, 32-34 inches tall) is commonly used by local community in household for water storage purposes¹.

The project is initiated with major objective of using limited available resources, particularly commonly used mud pots for water storage (such as; Nadi) in rural household for filtration that could sustained itself, without any external interventions. In support of this initiative, project by following participatory approach, focuses on mobilization of communities, formation of community groups, construction, installation & maintenance of filter and follow-up trainings in use of the filter, safe water practices & hygiene and sanitation. The Post installation also includes monitoring and support from project staff for communities, as this proved to be more successful to promote filters and to gain greater access to women in communities. Project involves following major components

- Identification and need assessment of local communities
- Mobilization and formation of community groups
- Training and awareness raising workshop
- Nadi filter installation (onsite) including Laboratory water purification test
- Specialized Trainings (Nadi Filter TOT and Health & Hygiene)
- Follow up and monitoring field visits

Nadi filters are financed by Misereor Germany, UNEP-APFED, ADP & Oxfam GB. Under the project AHD has installed more than 2,200 Nadi filters during the past 3 years 2006-2008, providing life-sustaining water to more than 15,000 people, who are living in rural communities and install at least another 2,000 Nadi filters units during the next 2009 years, due to growing demand by coastal communities.

¹ AHD 2007, Access to safe drinking water with Nadi Filter in Thatta and Badin

2. Background information of the area / communities Thatta District

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The Sindh Province has a coastline of approximately 350 kilometers, that comprised of east of Karachi and districts of Badin and Thatta. However both, Badin and Thatta are two hazard prone mainly rural districts of Sindh Province of Pakistan, lying between Thar desert and coastal stretches of Arabian Sea. There are six coastal Talukas in Thatta and two in Badin. A chronology of disasters over the last five decades reveals that both of the aforesaid districts remained in the grip of uninterrupted cycle of disasters in one form or other. Cyclone, heavy rains and floods follow each other with short lived intervals. However, earthquake seems to be rare phenomenon proving to be less disastrous in its effects, in comparison to other hazards experienced by the communities at risk.

Poverty is widespread throughout both districts, 'Badin appeared to be the poorest district in Sindh'². Farming, livestock rearing and fishing are the lifeblood of some 50% rural people living in the coastal districts of Badin and Thatta³. However there are some side stream livelihood strategies adopted by local communities, which include woodcutting, Beeri making (local method of cigarette making), driving, sewing, stitching, mason work, coal making, individual labor and etc. The communities in costal areas are engaged with their respective occupations (agriculture and fishing) since generations. They term it as their ancestral occupation, which they think is the only secure/way of earning living for them and their families.

The communities living in coastal areas are trapped in a complex of vulnerabilities, for instance; the villages situated in close proximity of Arabian Sea are the most frequent subject to the periodical disasters & cyclones. The structure and placement of houses, non availability of disaster resistant physical infrastructures and the remoteness comes into alliance to constitute the physical vulnerability of communities at large. Apart from this, water resources mismanagement at upland multiplied miseries at downstream as districts are situated in the tale end of Indus delta. Therefore land under cultivation has become saline and degraded due to successive floods and sea erosion. A huge irrigation and drainage infrastructures (LBOD and RBOD) have also significantly added into the vulnerabilities of the area and communities living therein. (e.g. floods occurred because of the sudden breach in LBOD, caused huge losses).

2.1 Unsafe Water, Women and Children in Coastal Communities

Unfortunately, 10 million children die in the world every year, where Pakistan ranks 8th in the world with approximately 478,000 numbers of child deaths under 5-years of age every year. The health status of children in Pakistan is below acceptable levels, as infant and under five mortality rates are 77 and 94 respectively (PDHS 2006). Two-thirds of all children under one year die during first 28 days of life. Seasonal pneumonia and diarrheal episodes



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² Sindh rural development project October 2002

³ see census reports of district

are the major killers of children under five. Nevertheless a slight progress has been achieved in the last 10 years in infant and under five year mortality.



Canal water is being used for agricultural purposes but at the same time it being used for drinking purposes by the local farmers in Jati and Sujawal areas only some villages have sweet water hand pumps.

Over all education and health related picture of women and children in the rural coastal areas is bleak, as there are largely neglected aspects of the life. Traditionally women get no preference in health, education, food and clothing. The analysis of the reports reveals that the male literacy ratio is about three times higher as compared to females⁴, but sharp differences exist in the literacy ratios by area (rural and urban). The basic health needs of women and children are not being adequately met. Thatta and Badin have only 9&7 Mother and Child related Health Center respectively. Infections, malnutrition and the complications of the pregnancy and childhood continue to take heavy toll of life. Child mortality rates are 4 in 10 under the age of 2 years in some places. There are almost no adequate health services available to mitigate this situation. According to Sindh Bureau of Statistics that unsanitary condition, polluted water, illiteracy among rural mother, high fertility, small budgetary allocation and inadequate administrative structures have been identified as the main hurdles in the progress of health conditions. There are also clear differentials in health conditions by rural and urban areas and socio-economic groups.

Majority of the diseases in the areas are caused by malnutrition and the use of unsafe water. Safe water supply for human, animal and crop consumption is the critical issue for the costal communities. It also effects on their ability to own live stock, especially in the areas where there are severe problems of drinking water and fodder availability. Every

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⁴ Provincial census report 1998

documented beneficiary needs assessment mentions water supply as a major issue and most place a supply of drinking water as the first requirement for any project to tackle⁵. Lack of water impacts on the productive use of human time (women can spend all day fetching and carrying water), on health (dirty water means that a high proportion of the population, especially children, suffers from water-born disease), the distribution of the population (often along irrigation canals and drainage ditches) and the choice and productivity of crops. It can be fairly said that the failure of the water supply is the single most important constraint to any development in the coastal district.

Though there are various types of water sources available in coastal areas for drinking and domestics purposes, but majority of them are severely constrained in many ways. For instance, piped water supply mainly available for urban localities or near urban areas, remote and rural areas still deprived from this facility. Canal water is usually uncertain, irregular and polluted. Ground water, ponds and wells have become saline, due to continuous environmental degradation and water mismanagement since long. Therefore, the need for improved water is urgent but more importantly, it should be cost effective, simple and according to local conditions so that the poorest people of the region may efficiently own it.

3. Design of Bio-Sand Nadi filter units

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Nadi Filter Design Specifications



The design of Nadi filter unit is very easy, simple and adoptable. It's material available at local level / in villagers and is being used to store water and Mutka used widely in all over Pakistan to store drinking water. Means the Nadi filter technology is 100% local based technology which can be promoted at any where in Pakistan on large scale. AHD thankful for Oxfam GB Pakistan for this research study support and especially lab for Nadi filter technique promotion.

⁵ "Rapid Assessment of Coastal Fishing Communities in Coastal Badin, Sindh", NRSP, July 2005

14 steps process to make Nadi filter unit at any where:

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1. A hole is made for the pipe in the side of the Nadi using a screwdriver and a suitable stone or hammer. The bottom of the hole must be 20 inches above the ground. *The Nadi should be 32-34 inches tall.*

2. A single piece of stiff flexible pipe 30 inch long, 1 inch diameter and with no splits in it is fitted through the hole with one end inside the Nadi touching the bottom. It is put in place and the hole around the pipe made water tight with cement.

3. A water storage pot for the filtered water must be chosen. If it is a

Nadi with a tap it should be put up high enough for jug to go under its tap. Put this clean water storage Nadi on enough bricks to make this possible. The filter Nadi can then be put in place on enough bricks for the protruding pipe to be just above the top of the storage Nadi.

4. Potato size washed stones are placed in a single layer one stone deep at the bottom of the Nadi. The gaps between them form channels for the water to flow easily into the pipe.

5. Small washed stones are placed on top filling the gaps between the potato size stones. Enough should be placed to prevent the next layer of gravel from falling through and blocking the gaps under the potato size stones or clogging up the pipe.

6. A thin layer of washed, dhal size gravel is then spread to form a level surface over the small stones.

7. A thin layer of washed seed size gravel in then spread to form a level surface over the dhal size gravel.

8. These drainage layers must not exceed 4 inches in total thickness or there will not be enough room for the main material, the sand.

















9. Washed sand is then added to a level 5 inches below the level where the bottom of the pipe goes through the side of the Nadi.

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10. The Mutka is taken and a single hole is drilled in it using a 3 or 4 inch nail with a right angle bend in it to form a handle. At first this is difficult work but after a few minutes the hole is made without the need to hit it through with a hammer. Most screw drivers make holes that are a bit too large so a nail is better. The hole should be on the bottom of the Mutka about 4 inches to one side so as not to get blocked too frequently by debris settling in the Mutka.

11. The Mutka is then tied in place on top of the Nadi with the hole in the Mutka in line with the pipe coming out of the Nadi. A stone is wedged between the Mutka and Nadi so that the hole in the Mutka can be seen and it is easy to notice if the hole becomes blocked. String must be used to fix the Mutka in place in order to protect the good microbes in the Nadi from being disturbed.

12. A cloth is tied over the mouth of the clean water storage Nadi in such a way that the cloth is over the protruding pipe. The water should not be flowing onto the cloth at all, as this would re-contaminate the clean water.

13. Once dirty water has been given to the Nadi every day for two to three weeks the filter will function effectively so long as the sand is not disturbed. During this period the water will gradually improve. If the sand and stones were well washed, water can be improved a little by the filter even on the first day.

14. The Nadi for storing clean water should be emptied every three days during this initial period while water quality is rapidly improving.

Precautions / Safety Measures:

1. Pots for storing clean water should never be used for collecting dirty water.

2. When using a new Nadi to make a filter it should be first checked for leaks which should be repaired using cement.













3. Never completely fill a new Nadi or small cracks will develop. Only half fill it with water at first, then after two or three hours fill it completely and check for leaks.

4. If the filter gets too slow or stops working, remove the top few inches of sand from inside the Nadi. Wash this sand with water in a bucket or bowl then put it back in the Nadi. Make sure that the level of the sand in the Nadi is restored to 5 inches below the bottom of the pipe where it comes through the side of the Nadi.

5. When it becomes necessary to clean the sand in the filter it is good if there is another filter in the community that can be used for the two or three weeks it takes for the filter to build up its numbers of good microbes after being cleaned. Dirty water used for starting off a new or recently cleaned Nadi can be put through the new one then through an established one if it is necessary to drink this water.

4. How the Nadi filter works

The filter is simply an optimised residence for the "good microbes" that eat up the microbes that cause diseases. The filter is designed to protect the good microbes in the sand which would be destroyed if the sand was allowed to be churned up or drained of water. They require a stable surface to live on with a constant supply of dirty water and oxygen to feed on. The sand in the filter provides an enormous surface area for them to live on and they multiply to fill this space. This takes two to three weeks to establish. In the mean time the water is far better than before even after a day or two.

5. Parallels of Bio-Sand Nadi filter tests

Good microbes capable of cleaning water are freely available to all as they occur naturally in dirty water. God mercifully created these organisms knowing that we would mess up our drinking water and need help to get it clean again. Sickness and poor quality of life, even death can result from not using these God given organisms. The filter was designed with this in mind.

The big difference is if people believe and accept God's gift of the filter their lives will be improved.

6. Material Requirements to Nadi filter & Research Study

Potohar Jeep Nadi Mutka Sand Cement Mesh in three sizes Mesh cutter Screwdriver and hammer Plastic pipe String Nails Sacks Stationary Lights Camera for record keeping Office support staff costs Senior staff supervision costs

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## 7. Villages where 100 Nadi filter units tests conducted at Jati and Sujawal Talukas of Thatta District.

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| <i>S.</i> # | Name of village       | Area/Tehsil         | District  | Total filers<br>covered |
|-------------|-----------------------|---------------------|-----------|-------------------------|
| 1.          | Talib Richeo          | Jati                | Thatta    | 13                      |
| 2.          | Bohar                 | Jati                | Thatta    | 8                       |
| 3.          | Danial Goth           | Sujawal             | Thatta    | 8                       |
| <i>4</i> .  | Nizam Baran           | Sujawal             | Thatta    | 10                      |
| 5.          | Somar Chang           | Sujawal             | Thatta    | 8                       |
| 6.          | Wadera Palari         | Sujawal             | Thatta    | 3                       |
| 7.          | Rana Jat              | Jati                | Thatta    | 6                       |
| 8.          | Master Sadiq          | Jati                | Thatta    | 15                      |
| 9.          | Chudhary<br>Arshad    | Jati                | Thatta    | 12                      |
| 10.         | Hyderabad             | Hyderabad/Latifabad | Hyderabad | 11                      |
| 11          | Rajmani               | Jati                | Thatta    | 6                       |
| Total Na    | di filters / families |                     |           | 100                     |

#### 8. Tests of 100 Nadi filter samples at Oxfam GB + AHD established Lab:

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#### 8.1 Establishment of Lab:

The lab is well equipped with the necessary instruments ,we are checking the water

which is consist of different type of coli form bacteria chemicals no any organization working on water research in the whole Pakistan only one organization AHD is working it has engineer ,technological staff and also social moblizers are working in the fields among the people ,whose are not able provided drinking water for himself so we thought provide the water by natural process, I am going to introduced you to about Nadir Filter water



,it very effective and removed 100% coli form through this simple procedure it is called Bio-Sand Nadir filter Water. You can save yourself and your family from this simple water filtration, if your agree with us, we can provide you long term Nadir Filter Water

#### 8.2 Activities of Lab:

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1. Drinking water will be tested to see the no. of faecal coli forms at filed and office level of about 100 Nadi filter units installed in Jati area and Sujawal and Hyderabad.



2. The tests will show the physical and microbiological appearances of the facial coli forms and bacteria

3. Chemical test's will be conducted at office level as chemical test equipment is digital and sensitive difficult to operate at filed.

2. Samples collection is process how to collect samples from filed and takes care that other contamination not involved during sampling.

3. Results and reports should be noted very accurately and display to all to check and verify if any one have any doubt.

Application form should be fill if any organization/person to test their own water samples by AHD Lab: in application form all details of requirements is present.

#### **Responsible staff of lab:**

- 1. Research Officer, Mr. Mazhar Ali, Ph: # +92-22-3860880
- 2. Lab: Assistant, Mr. Inderyas Gill, Cell # 0345-3537042
- 3. Filed Supervisor, Mr. Raza Khokhar, Cell # 0334-4456362

#### **Procedure / Methodology:**

**8.3 Introduction of test** 

The test conducted for water quality monitoring in which we determine four major tests:

- 1. pH,
- 2. Chlorine Residual,
- 3. Turbidity, and
- 4. Faecal coli forms

**pH**, the pH meter equipment helps to determine the Total pH from given sample

#### Chlorine Residual,

When determination of Chlorine residual required, Put tablet (DPD No. 03) in to pool tester meter to know the Chlorine level in water

#### Turbidity, and

Through this meter the turbidity can be determined from the given sample of water

#### **Faecal Coli forms**

Delqua kit is useful to determine the faecal coli Forms through the sample preserving 16 hours in The Delqua kit incubator

#### pH Comparator



#### **Chlorine Residual**





**Delqua Kit** 



We tested 100 Nadi filters, the sample collect from Nadi filter which is installed at Thatta and Hyderabad districts. 100 Nadi filters test as that check the quality of inlet of water which collects from canal and outlet from Nadi filter. The effective ness is show data sheet that how much difference in unfiltered and filtered water.

#### **<u>8.4</u>** Procedure of test:

To starts the tests first tested pH, chlorine and turbidity for pH and chlorine tablets put into comparator then the color of sample matches with standards. Then for faecal coli form test first made culture media it takes some time and very care, after making media sterilize the all accessories, then starts the test, pass water from filter paper and put filter paper into patri dishes on adsorbent pad, after all samples has been done then I put all patri dishes into incubator which is present into kit and leave it for 16 hrs as per kit standards for the heating in incubator the temperature range at 45 degree centigrade. After 16 hrs remove dishes form incubator and count the colonies, the data sheet is attached with this one. The WHO standard is zero fecal coli form in drinking water. The chemical parameters of drinking water also tested.

#### 8.5 Parameters / equipments used

Equipment used for the tests is delagua kit and Denver pH/Ion meter in which all these twelve tests can be determine.

#### **Biological Tests Conducted:**

- 1) Turbidity: we can measure the turbidity of water through this NTU Tube.
- 2) pH: we can check the pH value of water by this comparator.
- 3) Chlorine (CI): we can measure the level of chlorine in water.
- 4) Faecal Coli form: We can count the Faecal Coli forms by incubation procedure Colonies by the Biological test.
- 5) Thermometer: We can check the temperature of water (cold & hot).

#### Parameters:

- 1. Collect samples carefully
- 2. samples should be tested within 2 hrs as kit standards
- 3. for coli form test, culture media is prepared at head office with very care
- 4. all accessories sterilized carefully
- 5. Do not touch any thing during practical for faecal coli form test.
- 6. for chemical analysis pH/ion meter is used



#### **<u>8.6</u>** Tests Results

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All 100 filters tested from different locations in the community at thatta and Hyderabad districts, it is clear that filters is effective for filtration of water. Research work is shows the condition of tests result which is in data sheet.



The snaps showing 4 samples taken 2 from source of water and 2 from the Nadi filtered water the source of water is canal water and tape water which is in high faecal coli forms colonies means unfit for drinking purposes but in the Nadi filter 1 and Nadi filter 2 there is only 1 and 2 faecal coli forms which results 98 to 99% and shows that Nadi filter water is the fit for drinking purposes.

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### Performance of Bio-Sand Nadi Filters.

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Tests conducted at AHD + Oxfam GB Lab at Hyderabad

| Parameter of water quality | Purification effect of slow sand filtration                                    |
|----------------------------|--------------------------------------------------------------------------------|
| Color                      | 60% to 100% reduction                                                          |
| Turbidity                  | Turbidity is generally reduced to less than 1<br>NTU                           |
| Faecal coliforms           | 95% to 100%, and often 99% to 100%, reduction in the level of faecal coliforms |
| Cercariae                  | Virtual removal of cercariae of schistosomes, cysts and ova                    |
| Viruses                    | Virtually complete removal                                                     |
| Organic matter             | 60% to 75% reduction in COD                                                    |
| Iron and manganese         | Largely removed                                                                |
| Heavy metals               | 30% to 95% reduction                                                           |

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|     |                | epanos teteW                     |            | nd pump            | nal wate  | nal wate  | nal wate<br>nal wate | nal wate            | nal wate  | nal wate                | nal wate  | nal wate           | nal water | nal water   | nal water | mai water | Ind water | ind water          | Ind water | ind water            | ind water | ind water | mai water | nal water | rial water | nal water | rial water | mai water    | rial water | nal water | rial water    | rial wato | nal water | rial water | rial water   | rual wratter |
|     |                | (Inim Leteli.2)                  |            | 65 Ha              | 65 Ca     | 62 Ca     | 39 Ca                | 91 Ca               | 75 Ca     | 63 Ca                   | 23 Ca     | 55 Co              | 87 Ca     | 62 Ca       | 6 0       | 91 Ca     | P Po      | 45 Pc              | 72 Pc     | 8 90                 | a a       | 6 Pc      | 8 4       |           | A Ca       | 42 Ca     | 6 C#       | 72 Ca        | 8 Ca       | 45 Ca     | 665 Ca        | 0         | 3 Ca      | 24 Ca      | 19 Ca        | 8 Ca         |
| Ĭ   | 2              | ateR wold                        |            | 1 2                | 5 2       | 1 5       | ta<br>ta<br>0        | 5 0 0               | 14 0      | the o                   | 1 1       | 1 1<br>0 0         | 1 1       | a 1         | e ti      | a 1       | a a       | 5 0                | 1         | ta 0                 | 1         | 13 0      |           | 0         |            | 0 0       | (A 0       | 5 1          |            | 0         | 5 1           | 0         | 0         | 5          | 50           | o<br>B       |
| ן פ |                | District                         |            | That               | That      | That      | That                 | That                | That      | That                    | That      | That               | That      | The set     | That      | Part 1    | That      | That               | That      | The                  | That      | That      | and a     | That      | That       | That      | That       | That         | That       | That      | That          | That      | That      | That       | That         | That         |
|     | ;              | lindeT                           |            | Sujawal<br>Sujawal | Sujawa    | Sujawa    | Sujawal              | Sujawa              | Sujarata  | Sujawal                 | Sujarwal  | Sujawal            | Sujawal   | Sujawa      | Sujawal   | Sujawal   | Sujawa    | Sujawal            | Sujawal   | Sujawal              | Sujawa    | Sujawal   | sujaval   | sujaval   | lews/us    | sujaval   | sujawal    | sujaval      | sujeval    | sujaval   | int.          | hall      | dati      | Hall I     | dati.        | Hab          |
| 0   |                | an                               |            | Jar<br>Jar         | al a      | Jar.      | Jar<br>Jar           | Jar<br>Lar          | Jar       | Jar<br>Lar              | Jar       | Jar                | Jar       | Jar<br>Ise  | Jar       | -ler      | Jar       | Jar                | Jar       | Jar                  | uer -     | Jar       | Jar       | Jar       | -int       | Jar       | Jar        | Jar<br>Tor   | Jar        | Jar       | -lar          | uen inter | Jati      | dath       | Liati        | Int          |
| Į   | )              |                                  |            | goth               | goth      | Both      | goth<br>goth         | goth<br>catari      | palari    | baran                   | baran     | baran              | baran     | baran       | beran     | baran     | chang     | chang              | chang     | chang                | Chang     | Chang     | 10        | - Jak     | të s       | unt i     | Inni       | ine          | jue        | iani      | iani<br>Maraj | ad Arai   | ad Arah   | ad Aral    | ad Aral      | ad Arai      |
| ļ   |                |                                  |            | Dania              | Dania     | Dania     | Dania                | Dania               | vadera    | Vadera                  | Nazam     | Nazam              | Nazam     | Nazam       | Nazam     | Nazam     | t Soomar  | Soomar             | Soomar    | Soomar               | Soomar    | Soomar    | Rang      | Ran       | Rane       | Ran       | Rajn       | Test<br>Test | Rain       | Rain      | TH Arsh       | HArsh     | H.Arsh    | H.Arsh     | H.Arsh       | ( H.Arsh     |
|     |                | locome<br>Bource of              |            | Padri              | riculture | riculture | riculture            | infoulture          | riculture | riculture<br>riculture  | riculture | riculture          | riculture | riculture   | riculture | riculture | 1: servan | riculture          | riculture | riculture            | riculture | riculture | riculture | riculture | riculture  | riculture | riculture  | riculture    | riculture  | riculture | riculture     | riculture | riculture | t serven   | riculture    | t. servary   |
|     |                | No. of Childen                   |            | 94 0               | 2 4       | ( A .     | 2 PC                 | 2 20                | Ā         | T AC                    | 8 46      | 5 4                | A         | A           | Ā         | A         | 5 60      | 8 4                | 8         | 4 A                  |           | ¥         | 18 AG     | 7 A       | T AS       | 4 9       | 3 AG       | 10 Ac        | 4 PC       | 16 Ag     | 2 AG          | 9 6       | 4 AG      | 5 60       | R AC         | 7 60         |
|     |                | Alame / female                   |            | 4 2                | ~ =       |           | 0 10                 | ω                   | H         | 10                      | -         | un l               | H         | 1           | Ħ         | +         | m         | 10 1               |           | N                    | t         |           | 12        | m         |            |           | 2          | 0 0          | 0 00       | 14        | 4 4           |           | 9         |            | 0 4          | 9            |
| 5 5 |                | Viewel 10. of family<br>stdemens |            | 4 10               | - u       |           | 0 -                  | 80                  | Ħ         | 12                      | 14        | 9                  | Ħ         | 1           | Ħ         | 1         | 8         | <b>2</b> \$        | 2 =       | φ                    | t         |           | 8 -       | 9         | \$ 0       | 9 9       | 10         | 14           | 12         | 30        | 00 E          | 19        | 10        | 00 e       | 12           | 13           |
|     |                | bioH<br>Hold                     |            | rafique            | th Ityas  |           |                      | f Masth<br>of somer | Oadir Bux | assan Isha<br>ufi baran | Salah ban | khan bara<br>comar | 5         | od Baran    | Waz       | Dino      | hanif     | soomar             |           | in khan              |           |           |           |           | -          | 04        | 91         | 3            | 5          |           |               |           |           |            | aino         |              |
| jr  |                |                                  |            | 8 Padr<br>8 Ch: 0  | 8 Dani    | 6 Bark    | 6 imrer              | 8 Sharl             | 10 Umar   | 11 Gulh<br>B Hail /     | B Moho    | 8 Mohx<br>8 Haii a | 8 Usm     | 9 Ahms      | 1 AILN    | 2 Sain    | 8 Mhoc    | 8 Mhoc             | 8 Rafig   | B Patho              | Haji      | 8 Feros   | B Rana    | Alaz      | 8 Ashe     | 8 Obha    | 9 Pretp    | 9 youst      | 9 Umar     | 9 Nazir   | a hafee       | Byas      | bhan      | 9 tallb    | a sten       | a bach       |
| 2   |                | Read of MF                       |            | 20.11.0            | 20.11.0   | 20.11.0   | 20.11.0              | 20.11.0             | 18.01.20  | 15.10.0                 | 25.10.0   | 25,10.0            | 25.10.0   | 25,10,5     | 25.10.1   | 25,10.1   | 28.12.0   | 20,11.0            | 05,12.0   | 15.11.0              | 15,11,0   | 15.11.0   | 10.12.0   | 8.12.06   | 25,11,0    | 05.12.0   | 08.01.0    | 08.01.0      | 05.01.0    | 05.01.0   | 25.12.0       | 27.12.0   | 10.01.0   | 10.01.0    | 10.01.0      | 10.01.0      |
| õ   | -              | Date of Nadi<br>Drillem tetilit  |            | 15.09.07           | 16.09.07  | 16.09.07  | 16.09.07             | 1.12.2007           | 1.12.2008 | 1.12.2009               | 07.08.08  | 07.08.08           | 07.08.08  | 07.08,09    | 07.08.11  | 07.08.12  | 24,10.08  | 25.06.08           | 27.06.08  | 28.06.08             | 28.06.06  | 28.06.08  | 15.08.08  | 10.08.08  | 10.08.08   | 13.08.06  | 05.10.08   | 06.10.08     | 10.10.00   | 12.10.08  | 12.10.08      | 06.03.07  | 05.03.07  | 06.03.07   | 06.03.07     | 08.03.07     |
| 4   | and a compared | liamification of<br>filler       |            | D1<br>D2           | D3        | 50        | 07                   | 60 Hay              | VP2       | VP3                     | NB2       | NB4                | NB5       | NB6         | NB8       | NB9       | SC1       | 22                 | SC4       | SCS                  | SC7       | \$C8      | E IS      | RJ3       | RJA        | RJ6       | RAUH       | RAUZ         | RAM        | RAJE      | RAJE          | A02       | EAA       | AAA        | AAB          | AAT          |
| 31) | teria dista    | notice of cample                 |            | 8.2.09             | 9.2.09    | 8-2-09    | 87708                | 8-2-09              | 8-2-09    | 01.09                   | 01.09     | 01.09              | 01.09     | 01.10       | 01.12     | 01.13     | 01.09     | 60100              | 01.09     | 00100                | 02.09     | 02.09     | 01.00     | 01.09     | 01.09      | 01.09     | 01.00      | 01.09        | 01.09      | 01.09     | 02.09         | 02.09     | 02.09     | 02.09      | 02.09        | 02.09        |
| ]   |                | cojj                             | andards    | 10pm 11<br>25pm 11 | 35pm 1    | 45pm 1    | 55pm 1               | 00pm 1              | 15pm 1    | 10pm 09                 | 20pm 09   | 30 mq00            | 50pm 06   | 56pm 09     | 20pm 09   | 35pm 05   | 10am 10   | 40am 10<br>50am 10 | 06am 10   | 15am 10<br>25.4.4 44 | 30AM 11   | 35AM 11   | 100m 22   | 40pm 22   | 55pm 22    | 15pm 22   | 30am 23    | 50am 23      | 35am 23    | 45am 23   | 55am 23       | 40am 19   | 50am 15   | 05am 15    | t0am 20      | 20qm 20      |
| P   |                | epos                             | kistani st | C 5 03             | C7 03     | C 9 03    | 11 03                | C 12 04<br>S1 3.0   | 82 3.     | C1 02:                  | C 2 02    | C3 02<br>C4 24     | C5 02     | C6 2        | C 8 3     | 110 34    | 02 10     | 04 10              | 06 11     | D7 11 11             | H4 10:    | H5 10     | F 1 06    | F.4 05.   | F 5 05:    | F7 06:    | G1 10:     | 62 10        | 35 11:     | 66 11     | 01 10         | 02 10:    | 03 10     | 04 11      | 11 90        | 07 11        |
|     |                | elines?                          | â          |                    |           |           |                      |                     |           |                         |           |                    |           |             |           |           |           |                    |           | -                    | 1.55      |           |           | 100       |            |           |            |              |            |           |               |           | 16        |            |              |              |

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| 11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11<                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |               |               |             |             |             |             |             |             |            |              |             | TT-           |              |             |              | 1            |              |             |              |             |             |             |             |              |             |             |             |             |             |             | 1.5         |             |             |             |             |             |               |              |                 |             |              |              |               |             |               |              |             |             |              |             |
| 1 1 1 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |               |               |             |             |             |             |             |             |            |              |             |               |              |             |              |              |              |             |              |             |             |             |             |              |             |             |             |             |             |             |             |             |             |             |             |             |               |              |                 |             |              |              |               |             |               |              |             |             |              |             |
| 0         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2             | 20            | 16            | 74          | 7.6         | 7.6         | 7.8         | 00          | 74          | •          | •            | 1.6         | 7.4           | 7.6          | 7.6         | 7.8          | -            | 7.6          | 7.8         | 8            | 7.8         | 60          | 00          | 00          | 80           | 7.8         | 7.8         | 7.8         | 7.6         | 7.6         | 42          | 48          | 42          | 82          | 82          | ~           | 15          | 91            | 8            | 2 4             | •           | 22           | 12           | 7.6           | 7.8         | 80            | 82           | 7.6         | 8.2         | 7.8          | 50          |
| 10         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11         11<                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1.8           | 92            | 7.4           | 7.6         | 7.6         | 7.2         | 72          | 72          | 7.8         | 0          | 2            | 72          | -             | 82           | -           | -            | -            | -            | ~           | -            | 7.8         | 7.8         | 7.8         | 18          | 1.8          | -           | ~           | 2           | -           | ~           | 7.6         | •           | 1%          | 82          | 18          | 82          |             | -             | 200          | 2 0             | 2           | 202          | 120          | 80            | 8.2         | 72            | 7.6          | 80          | 82          | 7.6          | 72          |
| 0.10         1.10         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1.000         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | •             | 0             | -0            | -           | 10          | 5           | 0           | 10          | 10          | -          |              | 9           | -             | -0           | 10          | 10           | -00          | 10           | 10          | -            | 10          | 9           | 10          | 50          | 10           | 10          | 10          | -           | 50          | 10          | -0          | -0          | 0           | 20          | -           | 0           | 0           | 0             |              | •               | •           | -            | 0            | 20            | 10          | u)            | -            | 50          | ŝ           | -            | -           |
| 0 10         10000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         100000         1000000         1000000         1000000         1000000         10000000         1000000000         1000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>a</b>      | 4             | 9             | 8           | 8           | 8           | 8           | 8           | 8           | 8          | 3            | 8           | 200           | \$           | 8           | \$           | \$           | \$           | 8           | 200          | \$          | 8           | 8           | 8           | 200          | 50          | 10          | 50          | 9           | 10          | 10          | 50          | 0           | 0           | 0           | 0           | 0           | 0             |              | 0 1             |             | . 0          | 0            | 20            | s           | ю             | w            | w           | w           | 10           | v           |
| 11         Name         N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               | 20            |               | -           |             |             | A           | 4           | A           |            | 0            |             | 80            | 8            |             | 8            | 4            | 4            |             | 8            | 0           | a           | •           | -           | -            |             |             | 8           |             | 8           |             |             | -           |             |             | -           | -           |               | -            |                 |             |              |              | -             |             | 0             | 0            | 0           | 4           |              | -           |
| 0.1         1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -             |               | 10            | 10          | 12          | 2           | 0           | 0           | 0           |            | ,            | 9           | 4             | 9            | 4           | 8            | 0            | 0            | 20          | 2            | 12          | *           |             | countable   | countratio.  | 5           | 2           | 8           |             | 2           | 300         | 2           | 385         | 99          | 2           |             | IR.         | -             | <b>8</b>     | 8               |             | 4            |              | 0             | 9           | 90            | 96           | 14          | 0           | 2            | 9           |
| UN         UN<                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 8             | 22            | 182           | 110         | 113         | 107         | 110         | 115         | 116         | 40E        | 01           | 101         | 110           | 110          | 110         | 110          | 110          | 110          | 110         | 110          | 110         |             |             | 110 14      | 110 100      | 280         | 280         | 280         | 280         | 280         |             | 280         | 9 <u>9</u>  | 周           | 280         | 8           | 8           | 790           | 8            | 446             | 01          | 115          | 115          | 115           | 115         | 116           | 115          | 115         | 115         | 115          | 115         |
| 0.0         1.0         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0001         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011         0.0011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | al water      | al water      | al water      | al water    | al water    | of water    | N water     | M water     | d water     | d unstar   | al water     | al water    | al water      | al water     | al water    | al water     | al water     | al water     | al water    | al water     | ni water    | al water    | al water    | al wrater   | el water     | d water     | I water       | d water      | Jalew D         | D Water     | a water      | o water      | water         | water       | water         | water        | water       | water       | water        | water       |
| 10.         11.100m         12.00m         12.00m <td>0.3 Can</td> <td>0.85 CBM</td> <td>0.9 Cans</td> <td>1.2 Cana</td> <td>0.7 Cana</td> <td>0.89 Cana</td> <td>0.3 Cana</td> <td>0.45 Cana</td> <td>0.6 Cant</td> <td>00 Can</td> <td>100 000</td> <td>1.5 Can</td> <td>2.9 Cana</td> <td>1.52 Cana</td> <td>0.6 Cana</td> <td>0.8 Cana</td> <td>0.5 Cana</td> <td>0.45 Cana</td> <td>0.37 Cana</td> <td>2.9 Cana</td> <td>1.52 Cana</td> <td>0.6 Cana</td> <td>0.8 Cane</td> <td>0.5 Cana</td> <td>0.45 Cane</td> <td>0.38 Pon</td> <td>0.4 Pon</td> <td>0.5 Pon</td> <td>0.35 Pon</td> <td>0.95 Pon</td> <td>0.23 Pon</td> <td>1.5 Pon</td> <td>29 Pon</td> <td>1.52 Pon</td> <td>0.6 Pon</td> <td>0.8 Pon</td> <td>0.5 Pon</td> <td>UD LOU</td> <td>U.S/ Pon</td> <td>100 LOU</td> <td>de 1</td> <td>0.5 Tap</td> <td>0.91 Tap</td> <td>0.56 Tap</td> <td>0.65 Tap</td> <td>0.5 Tap</td> <td>0.87 Tap</td> <td>0.62 Tap</td> <td>0.39 Tap</td> <td>0.5 Tap</td> <td>191 Tan</td>                                                                                                       | 0.3 Can       | 0.85 CBM      | 0.9 Cans      | 1.2 Cana    | 0.7 Cana    | 0.89 Cana   | 0.3 Cana    | 0.45 Cana   | 0.6 Cant    | 00 Can     | 100 000      | 1.5 Can     | 2.9 Cana      | 1.52 Cana    | 0.6 Cana    | 0.8 Cana     | 0.5 Cana     | 0.45 Cana    | 0.37 Cana   | 2.9 Cana     | 1.52 Cana   | 0.6 Cana    | 0.8 Cane    | 0.5 Cana    | 0.45 Cane    | 0.38 Pon    | 0.4 Pon     | 0.5 Pon     | 0.35 Pon    | 0.95 Pon    | 0.23 Pon    | 1.5 Pon     | 29 Pon      | 1.52 Pon    | 0.6 Pon     | 0.8 Pon     | 0.5 Pon     | UD LOU        | U.S/ Pon     | 100 LOU         | de 1        | 0.5 Tap      | 0.91 Tap     | 0.56 Tap      | 0.65 Tap    | 0.5 Tap       | 0.87 Tap     | 0.62 Tap    | 0.39 Tap    | 0.5 Tap      | 191 Tan     |
| U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U         U U <thu th="" u<=""> <thu th="" u<=""> <thu th="" u<=""></thu></thu></thu>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Ihatta        | Ihatta        | Thatta        | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thette     | Euser .      | Thatta      | Thatta        | Thatta       | Thatta      | Thatta       | Thatta       | Thatta       | Thatta      | Thatta       | Thatta      | Thatta      | Thatta      | Thatta      | Thatta       | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Thatta      | Inalta        | Ihatta       | Ellen I         | Decision/   | rderabad     | PNH          | PMH           | P/H         | PMH           | P/H          | PMH         | P/H         | PMH          | Hud         |
| U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U         U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | lat           | Jati          | Jati          | Jafi        | Jati        | Jati        | Jati        | Jati        | Jati        | lati       | 191          | Jati        | Jati          | Jeti         | Jati        | Jati         | Jati         | Jati         | Jati        | Jati         | Jati        | Jati        | Jati        | Jafi        | Jati         | Jati        | Jafi        | Jafi        | Jati        | Jati        | Jati        | Jati        | Jati        | Jafi        | Jati        | 1901        |             | 1997          | 1907         | URL Dates       | ADEADAD IN  | atrabad Hy   | asimabad     | asimabad      | atifabad    | atifabad      | atifabad     | atifabad    | atifabad    | atifabad     | atfabad     |
| OUI         DUID         DUID <thd< td=""><td></td><td></td><td>field</td><td>Jati</td><td>Jafi</td><td>Lati</td><td>Jati</td><td>dati</td><td>Jati</td><td>lahi</td><td>IIII</td><td>field</td><td>Jati</td><td>Jati</td><td>fat</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Cat</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jefi</td><td>Jeti</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jati</td><td>Jati</td><td>(inter-</td><td>left</td><td>Jati</td><td>Jat</td><td>(IBC)</td><td></td><td>1 International</td><td>Decelle</td><td>attabad</td><td>atrabad qu</td><td>latifiabad qa</td><td>latifabad 1</td><td>latifabad l</td><td>latifiabad 1</td><td>latifabad 1</td><td>latifabad l</td><td>latifabad L</td><td>Istikahad I</td></thd<>                                                                                                                                                                                                                                                                                                                                      |               |               | field         | Jati        | Jafi        | Lati        | Jati        | dati        | Jati        | lahi       | IIII         | field       | Jati          | Jati         | fat         | Jati         | Jati         | Jati         | Cat         | Jati         | Jati        | Jati        | Jati        | Jati        | Jefi         | Jeti        | Jati        | (inter-     | left        | Jati        | Jat         | (IBC)         |              | 1 International | Decelle     | attabad      | atrabad qu   | latifiabad qa | latifabad 1 | latifabad l   | latifiabad 1 | latifabad 1 | latifabad l | latifabad L  | Istikahad I |
| Unit         Transmin         Transmin <th< td=""><td>Arshad Arai</td><td>Arshad Aral</td><td>Arshad Arai</td><td>Bohar</td><td>Bohar</td><td>Bohar</td><td>Bohar</td><td>Bohar</td><td>Bohar</td><td>Bohar</td><td>DUIN</td><td>Bohar</td><td>alb richyo</td><td>alib richyo</td><td>alth richyo</td><td>alib richyo</td><td>allb richyo</td><td>alb richyo</td><td>alib richyo</td><td>aib richyo</td><td>allb richyo</td><td>alib richyo</td><td>alib richyo</td><td>allb richyo</td><td>alib richyo</td><td>aster sadiq</td><td>aster Sadiq</td><td>piper sadig</td><td>7 Decletion</td><td>ahfabad 6</td><td>ryderabad</td><td>ryderabad</td><td>lyderabad</td><td>yderabad</td><td>yderabad</td><td>yderabad</td><td>yderabad</td><td>yderabad</td><td>uderahad</td></th<> | Arshad Arai   | Arshad Aral   | Arshad Arai   | Bohar       | Bohar       | Bohar       | Bohar       | Bohar       | Bohar       | Bohar      | DUIN         | Bohar       | alb richyo    | alib richyo  | alth richyo | alib richyo  | allb richyo  | alb richyo   | alib richyo | aib richyo   | allb richyo | alib richyo | alib richyo | allb richyo | alib richyo  | aster sadiq   | aster Sadiq  | piper sadig     | 7 Decletion | ahfabad 6    | ryderabad    | ryderabad     | lyderabad   | yderabad      | yderabad     | yderabad    | yderabad    | yderabad     | uderahad    |
| Unit         Unit <thunit< th="">         Unit         Unit         <thu< td=""><td>riculture .H.</td><td>riculture ,H.</td><td>ricutture .H.</td><td>: servant</td><td>: servant</td><td>: servart</td><td>C servark</td><td>: servant</td><td>Servant</td><td>- estrated</td><td>L. SELVAR</td><td>: servant</td><td>Tisher T</td><td>Tisher T</td><td>T T</td><td>Isher T</td><td>Isher T</td><td>Isher T</td><td>Isher T</td><td>Isher T</td><td>T Tisher T</td><td>T Taher</td><td>T Tsher T</td><td>T Tisher T</td><td>Isher T</td><td>ficulture M</td><td>ficulture M</td><td>ficulture M</td><td>iculture M</td><td>fouture M</td><td>riculture M</td><td>ficulture M</td><td>ricutture M</td><td>ficulture M</td><td>riculture M</td><td>nculture M</td><td>nculture M</td><td>ncunure M</td><td>ncumure M</td><td>ncurrure m</td><td>civice .</td><td>ervice</td><td>ervice 1</td><td>ervice h</td><td>ervice h</td><td>ervice h</td><td>ervice h</td><td>ervice h</td><td>laster h</td><td>ervice h</td><td>-</td></thu<></thunit<>                                                                                                                                   | riculture .H. | riculture ,H. | ricutture .H. | : servant   | : servant   | : servart   | C servark   | : servant   | Servant     | - estrated | L. SELVAR    | : servant   | Tisher T      | Tisher T     | T T         | Isher T      | Isher T      | Isher T      | Isher T     | Isher T      | T Tisher T  | T Taher     | T Tsher T   | T Tisher T  | Isher T      | ficulture M | ficulture M | ficulture M | iculture M  | fouture M   | riculture M | ficulture M | ricutture M | ficulture M | riculture M | nculture M  | nculture M  | ncunure M     | ncumure M    | ncurrure m      | civice .    | ervice       | ervice 1     | ervice h      | ervice h    | ervice h      | ervice h     | ervice h    | laster h    | ervice h     | -           |
| Unu         Unue         Unue <thu< td=""><td>By</td><td>Ag</td><td>Agi</td><td>Gov</td><td>Gov</td><td>Gov</td><td>Gov</td><td>Govt</td><td>Govt</td><td>Car</td><td>100</td><td>Gent</td><td></td><td>1</td><td></td><td></td><td>F</td><td></td><td></td><td>-</td><td></td><td>-</td><td></td><td></td><td>Ĺ</td><td>Agr</td><td>Agr</td><td>Agr</td><td>Agt</td><td>Agr</td><td>Agi</td><td>Agi</td><td>Agi</td><td>Agi</td><td>HB.</td><td>BA</td><td>Ag.</td><td>BH</td><td>P.</td><td>Bu</td><td>*</td><td>97</td><td></td><td>63</td><td>10</td><td>5</td><td>5</td><td>50</td><td>•</td><td>45</td><td></td></thu<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | By            | Ag            | Agi           | Gov         | Gov         | Gov         | Gov         | Govt        | Govt        | Car        | 100          | Gent        |               | 1            |             |              | F            |              |             | -            |             | -           |             |             | Ĺ            | Agr         | Agr         | Agr         | Agt         | Agr         | Agi         | Agi         | Agi         | Agi         | HB.         | BA          | Ag.         | BH            | P.           | Bu              | *           | 97           |              | 63            | 10          | 5             | 5            | 50          | •           | 45           |             |
| VUN         T.200em         Z.102.09         Arti         Geody         The control         System         T         T           0.11         12.200em         21.02.09         Arti         16.0307         25.12.08         Sistems         12.           AB1         10.456m         22.02.09         B2         11.06.06         10.01.09         Mehtm         6         2           AB3         11.056m         22.02.09         B3         11.06.06         10.01.09         Mehtm         12         4           AB3         11.156m         22.02.09         B3         11.06.06         10.01.09         Meht         2         2           AB4         11.156m         23.02.09         B3         11.00.00         Mehtm         4         2           AB<1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4             | 0             | 7             | 4           | 2           | 00          | *           | 50          | 3           | -          |              | 0           | -             | 80           | 80          | 4            | 2            | 2            | ~           |              | -           |             |             | -           |              | \$          | 6           | -           | 80          | 9           | -           | -           | +           | +           | +           | +           | +           | +             | -            | ~               | 4 4         | ~            | +            | -             |             |               | _            | _           |             | _            |             |
| V10         11.30am         21.02.09         Anti         66.000         19.401         21.02.09         Anti         66.000         19.401         20.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001         21.001 <td>-</td> <td>2</td> <td>6</td> <td>5</td> <td>4</td> <td>2 4</td> <td>5</td> <td>1 6</td> <td>50</td> <td>0</td> <td>0 1</td> <td>2</td> <td>3 6</td> <td>2 4</td> <td>0 2</td> <td>5</td> <td>8 0</td> <td>5</td> <td>4</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td>-</td> <td>1</td> <td>5 2</td> <td>2 5</td> <td>4 4</td> <td>0 5</td> <td></td> <td>-</td> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>+</td> <td>-</td> <td>0</td> <td></td> <td>9</td> <td>+</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>_</td> <td></td> <td>_</td> <td></td>                                                                                                                                                                                                                                                                                                                                                                                                                                            | -             | 2             | 6             | 5           | 4           | 2 4         | 5           | 1 6         | 50          | 0          | 0 1          | 2           | 3 6           | 2 4          | 0 2         | 5            | 8 0          | 5            | 4           |              |             |             | -           |             | -            | 1           | 5 2         | 2 5         | 4 4         | 0 5         |             | -           | +           | +           | +           | +           | +           | +             | -            | 0               |             | 9            | +            | -             | -           | -             | -            | _           |             | _            |             |
| U IU         U IJOB         LIALUDB         ANIU         U ISOBIL         LIALUDB         LIALUDB <thliaddb< th=""> <thliaddb< th=""> <thliaddb< t<="" td=""><td>2)4Z</td><td>all akbar</td><td>saen bur</td><td>khadim</td><td>akhtar</td><td>nizam</td><td>nazam</td><td>mumtaz</td><td>amir khan</td><td>michtan</td><td>hpilianii</td><td>alah dino</td><td>khan</td><td>nizam</td><td>mukhtiar</td><td>alah wasayo</td><td>sahrif</td><td>khadim</td><td>danish</td><td>ali mohammad</td><td>allah dino</td><td>mehrab</td><td>shahnoor</td><td>gulsher</td><td>Mohammad Dur</td><td>munwar</td><td>haji</td><td>khairl 1</td><td>arshad</td><td>nawab</td><td>Nawaz</td><td>Yousaf</td><td>Hand pump</td><td>Farman</td><td>Chan</td><td>Kalib</td><td>Yousaf khan</td><td>Bransna</td><td>Tshad</td><td>ADGUI LARGE</td><td>wher</td><td>Munit</td><td>Raza khokhar</td><td>Mariam sabir</td><td>Bashir</td><td>Mehvish kiran</td><td>Khalid</td><td>Humera</td><td>Saleem</td><td>Sir Khurshid</td><td>Office</td></thliaddb<></thliaddb<></thliaddb<>                                                                                              | 2)4Z          | all akbar     | saen bur      | khadim      | akhtar      | nizam       | nazam       | mumtaz      | amir khan   | michtan    | hpilianii    | alah dino   | khan          | nizam        | mukhtiar    | alah wasayo  | sahrif       | khadim       | danish      | ali mohammad | allah dino  | mehrab      | shahnoor    | gulsher     | Mohammad Dur | munwar      | haji        | khairl 1    | arshad      | nawab       | Nawaz       | Yousaf      | Hand pump   | Farman      | Chan        | Kalib       | Yousaf khan | Bransna       | Tshad        | ADGUI LARGE     | wher        | Munit        | Raza khokhar | Mariam sabir  | Bashir      | Mehvish kiran | Khalid       | Humera      | Saleem      | Sir Khurshid | Office      |
| 0 10         11.36em         21.42.09         AA10         06.03.07         1           0 11         12.200         21.300         21.100.08         1         10.03.08         1           0 12         12.300         21.0209         AA11         15.03.07         2         1         10.03.08         1           0 12         12.300         21.00         AA1         15.03.07         2         1         10.03.08         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80.00.0       | 90717         | 5.12.08       | 00100       | 60100       | 01.09       | 01.09       | 01.08       | 01.08       | 01.00      | 00.11.00     | 01.08       | 2.12.08       | 5.12.08      | 12.08       | 12.08        | 12.08        | 12.08        | 12.08       | 5-1-09       | 5-1-09      | 60-1-5      | 5-1-09      | 5-1-09      | 60-1-5       | 112.08      | 0.12.08     | 0.12.08     | 0.12.08     | 0.12.08     |             |             | T           |             | T           | T           | T           |               |              | - And           | ites it     | 90.01.08     | 10.09        | 5.10.10       | 10.11       | 10.12         | 10.13        | 10.14       | 10.15       | 10.16        | 10 17       |
| 0.10         11.366m         21.02.09         A411           0.11         12.200m         21.02.09         A411           0.12         12.300m         21.02.09         A411           0.12         12.300m         21.02.09         A411           0.12         12.300m         21.02.09         B41           11.200m         22.02.09         B5           AB1         11.300m         22.02.09         B6           AB2         11.300m         22.02.09         B6           AB3         11.000m         23.02.09         B7           AB3         11.300m         23.02.09         B7           AB4         11.300m         23.02.09         B7           AB4         11.300m         23.02.09         B7           AB4         11.300m         23.02.09         B7           AB5         12.000m         18.2.09         TR1           B1         12.302.09         B7         TR1           B2         12.302.09         B7         TR1           B1         12.302.09         TR1         TR1           B1         12.302.09         TR1         TR1           B1         12.300m         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 10:03:0/ 12   | 10.00.01 20   | 16.03.07 25   | 10.08.08 10 | 11.08.08 10 | 11.06.08 10 | 11.08.08 12 | 18.08.08 06 | 18.08.08 06 | 20.00.00   | 10 00'00'07  | 20.06.08 06 | 10.03.08 12   | 10.03.08 15  | 10.03.08 15 | 10.03.08 15  | 12.03.08 15  | 12.03.08 15  | 12.03.08 15 | 10=5.28 19   | 10=5.28 11  | 10=5.28 11  | 10=5.28 11  | 10=5-28 15  | 10=5-28 18   | 03.03.07 12 | 03.03.07 12 | 03,03.07 12 | 03.03.07 12 | 05.03.07 12 | -           |             |             | -           | +           |             |             |               |              | 4 00 UF 35      | 10,12,00    | 06.03.06 11  | #            | 15            | 15          | 15            | 8            | 18          | 15          | 4            | 4           |
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| U 10         11:36am         21.           U 10         11:36am         21.           0 11         12:30pm         21.           0 12         12:30pm         21.           0 13         11:05am         22.           AB1         11:55am         22.           AB2         11:05am         22.           AB3         11:05am         23.           AB4         11:35am         23.           AB5         12:30pm         23.           AB5         12:30pm         23.           B1         12:30pm         03.           A1         03.000m         04.           A1         11:156am         03.           B1         12:30pm         03. <td>4 6070</td> <td>H ANTO</td> <td>02.09 A</td> <td>12.09</td> <td>12.09</td> <td>12.09</td> <td>12.09</td> <td>12.09</td> <td>12.09</td> <td>00.0</td> <td>50.70</td> <td>12.09</td> <td>60.10</td> <td>60710</td> <td>11.09</td> <td>1 60.11</td> <td>11.09</td> <td>1 60'H</td> <td>1.09</td> <td>2.09</td> <td>2.09</td> <td>2-09 7</td> <td>2.09 T</td> <td>2-09 T</td> <td>2-09 T</td> <td>1 60.10</td> <td>11.09</td> <td>1 60'10</td> <td>1 60'14</td> <td>M.09</td> <td>2009</td> <td>2009</td> <td>2009</td> <td>2009</td> <td>2009 h</td> <td>Z009 N</td> <td>2009 1</td> <td>N 2007</td> <td>1 202</td> <td>1 00 0</td> <td>1 20110</td> <td>H 60'10</td> <td>-2003 H</td> <td>2009 H</td> <td>2009 H</td> <td>2009 H</td> <td>-2009 H</td> <td>-2009 H</td> <td>-2009 H</td> <td>2009 H</td> <td>2009 H</td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4 6070        | H ANTO        | 02.09 A       | 12.09       | 12.09       | 12.09       | 12.09       | 12.09       | 12.09       | 00.0       | 50.70        | 12.09       | 60.10         | 60710        | 11.09       | 1 60.11      | 11.09        | 1 60'H       | 1.09        | 2.09         | 2.09        | 2-09 7      | 2.09 T      | 2-09 T      | 2-09 T       | 1 60.10     | 11.09       | 1 60'10     | 1 60'14     | M.09        | 2009        | 2009        | 2009        | 2009        | 2009 h      | Z009 N      | 2009 1      | N 2007        | 1 202        | 1 00 0          | 1 20110     | H 60'10      | -2003 H      | 2009 H        | 2009 H      | 2009 H        | -2009 H      | -2009 H     | -2009 H     | 2009 H       | 2009 H      |
| 0.10         1         0.10         1           0.11         1         0.01         1         0.01         1           0.01         1         0.01         1         0.01         1         0.01         1           0.01         1         0.01         1         0.01         1         0.01         1         0.01         1           0.01         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1<                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1:Ddam 21.    | VIZ mdv2.2    | 2:30pm 21A    | 0:45am 22.0 | 0:55am 22.0 | 1:00am 22.0 | 1:15am 22.0 | 1:20am 23.0 | 1:30am 23.0 | 150 molt   | VC7 IIIPCC'I | 1:40am 23.4 | 03: 05pm 03.1 | 1: 20pm 03.0 | : 30pm 03.0 | 1: 40pm 03.0 | 1: 45pm 03.0 | 1: 55pm 03.0 | : 05pm 03.0 | 1: 06pm 18-  | 2: 20pm 18- | 2: 30pm 18- | 2: 40pm 18- | 1:45pm 18-  | 1: 56pm 18-  | 2:40pm 02.0 | 2:50pm 02.0 | 3:10pm 02.0 | 3:30pm 02.0 | 8:45pm 02.0 | 0:15am 16.4 | 0:30am 16.4 | 0:40am 16.4 | 0:45am 16.4 | 1:15am 16.4 | 1:45am 16.4 | 1:50am 16,4 | PURIDOUT TO A | 1.05 ms 10.1 | 4.02 ma01-1     | A11 11101.1 | 11.35am 17.4 | 1:00am 20-3  | 1:10am 20-3   | 1:30am 20-3 | 1:40am 20-3   | 0:15am 27-3  | 0:25am 27-3 | 0:50am 27-3 | 1:20am 27.3  | 1:30am 27.3 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1 010         | 11 110        | 012 14        | AB1 10      | AB 2 10     | AB3 11      | AB4 11      | AB5 11      | AB6 11      | 407 44     |              | ABS 1       | B1 12         | B2 12        | B3 12       | 84 12        | B5 12        | B6 12        | B7 01       | B8 12        | B9 12       | B 10 12     | B11 12      | B 12 12     | B 13 12      | A1 00       | A2 00       | A3 00       | A4 00       | A5 00       | A6 N        | A7 14       | A8 11       | A9 11       | A 10 1      | A11 1       | A12 1       | A13 2.        | A 14 11      |                 |             | E1 1         | EZ 1         | E3 1          | E4 1        | E5 1          | E6 10        | E7 10       | E8 10       | E9 11        | E 10 11     |



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|          | P        | Remark      |                              |                  |       |         |                  |          |          |          |          |          |          |             |          |          |          |          |            |                |          |          |                   |         |         |         |         |         |              |         |         |         |         |         |         |                |          |            |                |            |
|----------|----------|-------------|------------------------------|------------------|-------|---------|------------------|----------|----------|----------|----------|----------|----------|-------------|----------|----------|----------|----------|------------|----------------|----------|----------|-------------------|---------|---------|---------|---------|---------|--------------|---------|---------|---------|---------|---------|---------|----------------|----------|------------|----------------|------------|
|          |          |             |                              | tethio           |       | 00 1    | 7.8              | 7.8      | 7.8      | 7.8      | 7.8      | 7.2      | 7.8      | 1.6         | 7.6      | 7.8      | 1.1<br>R | 7.2      | 7.6        | 76             | 7.8      |          | 80 00             | 7.8     | 7.6     | 12      |         | 7.8     | 16           | 7.6     | 1.8     | 1.0     | 28      | 7.6     | 7.4     | 76             | 7.8      | 7.8        | 00 0           | 7.8        |
|          | 6        |             | Ŧ                            | teltuo<br>teltui |       | 5 72    | 5 72             | 5 72     | 5 72     | 5 72     | 6 72     | 5 7.6    |          | 5 72 8      | 5 72     | 5 7.2    | 5 70     | 00       | 8          | 200            | 5 7.6    | 5 7.6    | 2 1 8 1 9         | 5 7.8   | 5 8.2   | 0 0     | 00      | -       |              | 00      | 8 9     | 4 00    | 5 7.8   | 5 7.8   | 6 7.8   | 6 7.8<br>E 7.8 | 5 7.2    | 5 7.8      | 6 7.6<br>F 7.6 | 5 7.8      |
| ÷        |          |             | UTIN VIIbidhDT               | 20(4)            |       | 10      | 0 10             | 10       | 5        | 0 10     | m        | -        | -        | 0 10        | u        | 10       | 0 4      | un un    | 10         | 0 40           | 10       | 10       | 0 10              | 8       | 87      | 9 5     | 10      | 9       | 2 9          | 10      | 10      | 2 4     | o 10    | 10      |         | 0 4            | 40       | 04         | 99             | 60         |
| Ę        |          |             | epero<br>ortw                |                  |       | A       | 80 00            | 0        | 8        |          | æ        | 0        |          | n 4         |          | 0        | 0 0      | 0        | <b>m</b> 1 |                | 8        | 0        |                   | 0       | 10      | 0       | 8       | 0       | 0            | æ       | 8       | 0       |         | 4       | 9       |                | 8        | <b>a</b> 1 | <u>a</u> 4     | -          |
| <b>S</b> |          |             |                              | Palficio         | 0.0   | 0       | 10 10            | 0        | -1       | 10       | Ð        |          | ì        | 0 0         | 4        |          |          |          | 8          | n₽             | 8        | atate 1  | able 8            |         | othe 1  | ante p  | able 3  | a       |              | ιΰ.     | 8       | 4.8     |         |         |         |                | 0        | 10 1       | 00             | T          |
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| 5        |          |             |                              | antra            |       | mp 6    | ater 5           | ster 6   | ster 6   | ater 6   | ater 6:  | ater     | ater 3   | ater 25     | Mer 25   | ater 21  | ater 26  | ater     | ater 2t    | atter 29       | ster 25  | tter u   | fier L            | ter .   | Mer 4   | ter     | der u   | oter 4  | ater         | ster 3  | ater 3  | atter a | other 1 | ater    | ater    | ater           | ater 2   | ater 2     | ater 2         | ater       |
| 16       | 10       |             | eonio2 reteW                 |                  |       | nd pue  | anal wi          | anal w   | anal w   | anal wi  | anal w   | anal w   | anal w   | anal w      | anal w   | anal w   | anal w   | anal w   | anal w     | w lane         | anal w   | aw puo   | aw puo            | aw puo  | aw brio | aw puo  | ew pino | anal w  | anal w       | anal w  | anal w  | anal w  | anal w  | anal w  | anal w  | anal w         | analw    | anal w     | anal w         | W levie    |
| N N      | Ĕ        | ab<br>lyeis | (Jnim                        |                  |       | I       | 010              | 0        | 0        |          | 0        | 0        |          | 00          | 0        | 0        |          |          | 0          |                | 0        | <u>a</u> | <u>a</u> <u>a</u> |         | 0.0     | La      |         |         | 10           | 0       | 0       |         |         |         | 0       |                | 0        |            | 00             |            |
| Ó        |          | Ana         | Flow Rate (Liters /          |                  |       | 0.65    | 0.72             | 0.87     | 0.62     | 9.0      | 0.91     | 0.69     | 0.75     | 0.63        | 0.23     | 0.65     | 0.5      | 0.62     | 0.39       | 0.01           | 0.51     | 0.6      | 0.45              | 0.72    | 0.6     | 0.46    | 0.5     | 0.6     | 0.55         | 0.4     | 0.51    | 0.45    | 0.70    | 0.46    | 0.6     | 0.45           | 0.7      | 50         | 0.34           | 0.19       |
| Ω        | כ        |             | tondelC                      |                  |       | hatta   | hatta            | hatta    | hatta    | hatta    | hatta    | hatha    | hatha    | hatta       | hatta    | hatta    | hatta    | hatta    | hatta      | hatta          | hatta    | hatta    | hatta             | hatta   | hatta   | natha   | hatha   | hatta   | hatta        | hatta   | hatta   | hatta   | haffa   | hatta   | hatta   | hatta          | hafta    | hatta      | hatta          | hatta      |
| c        | Ø        |             |                              |                  |       | F       | FIF              | 1        | L        |          | F        | F        |          |             | -        | F        |          | -        | H          |                | 1        |          |                   |         | 7       |         | -       | F I     |              |         | F       |         |         | H       | -       |                | -        |            | T              |            |
| a        |          |             | BarleT                       |                  |       | Sujarni | Sujawi           | Sujawi   | Sujawa   | Sujawa   | Sujawa   | Sujawi   | Sujawi   | Sujawa      | Sujawa   | Sujawi   | Sujawi   | Sujawa   | Sujawr     | Sujawa         | Sujawa   | Sujawa   | Sujawn            | Sujawa  | Sujawi  | Sujaw   | Sujaw   | emeins  | sujawa       | sulaws  | sujawa  | sujawa  | sujawa  | meins   | sujawa  | surjawa        | Jati     | Jati       | Ushi inte      | - Inti     |
| Ξ        | Ľ        |             | on                           |                  |       | -       |                  |          | -        |          |          | -        | _        |             |          | -        |          |          |            |                |          | -        |                   |         | 4       |         |         |         |              |         |         |         |         |         | *       |                | R        |            |                |            |
| ta       | (1)      |             |                              |                  |       | ñ       | 2 1              | ñ        | 5        | 2 7      | ,<br>L   | ñ        | 5        | 5 -         | J.       | 5        | 7 -      | 5 7      | 5          | -<br>-         | - F      | al B     | 0 0               | 5 0     | 97 8    |         | P D     | 5       | 5 -          | 5       | 5       | 2       | 5 4     | 1       | 5       | 27 4           | rain Ju  | rain Ju    | rain Ja        | all all    |
| ïc       | ž        |             | agelity                      |                  |       | goth    | goth             | goth     | goth     | goth     | goth     | a palari | palari   | baran       | haran    | baran    | baran    | h baran  | h baran    | haran          | h baran  | ar chan  | ar chan           | ar chan | ar chan | ar Char | ar Char | Jat     | lat          | at      | Jat     | Tat     | = =     | E       | it      | = 7            | shad A   | shad A     | whad A         | of hard Al |
| a        | H        |             |                              |                  |       | Danial  | Danial           | Danial   | Danial   | Danial   | Danial   | vadere   | vaders   | Na7an       | Nazan    | Nazam    | Nazan    | Nazar    | Nazan      | Na2an<br>Na7an | Nazan    | Soom     | Soom              | Soom    | Soom    | Soom    | Soom    | Rana.   | Rana.        | Rana.   | Rana.   | Rana.   | Raima   | Rajma   | Rajma   | Rajma          | CH.An    | CH.An      | CH.Ar          | 1000       |
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| Þ        | <b>N</b> |             | amooni to estuo?             | ŝ                |       | Padri   | Agricult         | Agricult | Agricult | Agricult | Agricult | Agricult | Agricult | Agricult    | Agricult | Agricult | Agricul  | Agricult | Agricul    | Agricul        | Agricult | Gowt: 8  | Agricut           | Agricul | Agricut | Agricut | Agricut | Agricut | Agricut      | Agricut | Agricut | Agricut | Agricut | Agricul | Agricut | Agricut        | Agricul  | Agricul    | Agricul        | Anricut    |
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| 0        | Ľ        | P c         |                              |                  |       | Ĩ       |                  | T        |          | Ť        |          |          | xn.      | beus        | Daran    | aran     |          | -        |            | T              | T        | Ĩ        | _                 |         | Ĩ       | T       | T       |         | T            | T       |         |         |         | T       | Π       |                | a second |            |                |            |
| 2        | Ш        | formati     | eenoH to emeil<br>bloH       |                  |       | rafique | anial<br>h fluae | d a      | -        |          | Masth    | of soma  | Oadir E  | rif hara    | Salah    | kthan b  | oomar    | d Bara   | lisi       | Maz            | mad      | hanif    | sooma             | 16      | n khan  | 5       |         |         |              |         |         | 2 1     | -       | 5       |         |                | 2        |            |                |            |
| 0        | 5        | Ĭŝ          |                              |                  |       | Padri   | Ch: D            | Youas    | Barka    | Javec    | Shart    | youse    | Umar     | Guil hall A | Mohd     | Mohd     | Haji s   | Ahma     | M. Isn     | All Na<br>Sala | All Ah   | Mhod     | Racar             | Rafig   | Patha   | Hals    | Faro2   | Rana    | Ors Allar    | Ashai   | Khan    | Obha    | Pretp   | Manz    | Umar    | Nazir          | hafee    | Byas       | khan           | caffee     |
| ti,      | 5        |             | bries RV to stad             |                  |       | 10.2.09 | 10.2.09          | 10.2.09  | 10.2.09  | 10.2.09  | 10.2.09  | 8.2.09   | 8.2.09   | 15,2.09     | 15.2.09  | 15.2.09  | 15.2.09  | 15.2.00  | 15.2.09    | 15.2.09        | 15.2.09  | 5.3.09   | 5.3.09            | 5.3.09  | 5.3.09  | 5 1 00  | 5.3.09  | 112.09  | 11.2.09      | 11.2,09 | 11.2.09 | 11.2.09 | BD 2 20 | 25.2.09 | 28.2.09 | 25.2.09        | 63.09    | 6.3.09     | 60109          | 63.00      |
| a        | 5        |             | Guixem                       |                  |       | 10.6    | 10.0             | 10.6     | 10'6     | 10.6     | 10.6     | 2002     | 2008     | 808         | 80/8     | 80'8     | 80.8     | 80'8     | 8.10       | 8.11           | 8.13     | 80.0     | 80,08             | 80'90   | 90.96   | 90.08   | 90'90   | 80.8    | 80.80<br>BUB | 80.80   | 90.90   | 80.80   | 90.0    | 90.06   | 90.08   | 80.0           | 3.07     | 3.07       | 70.50          | 10.07      |
| Q        | 1        |             | Tellin in all the start      |                  |       | 15.0    | 16.0             | 16.0     | 16.0     | 16.0     | 16.0     | 1.12     | 1.12     | 1.1         | 01.0     | 570      | 07.0     | 07.0     | 07.0       | 01.0           | 0 07.0   | 24.      | 25.0              | 27.0    | 28.0    | 287     | 28.0    | 15.0    | 10.0         | 10.0    | 13.(    | 13.0    | 00 00   | 3 09    | 4 10.   | 5 12           | 03.0     | 08.0       | 02/20          | 050        |
| S        |          |             | to notestition of            |                  |       | 9 D1    | 0 03             | S Da     | 900      | 0 00     | 80 9     | PHV 8    | 9 VP2    | 0 VP3       | 6 NB2    | 9 NB3    | 0 NB4    | e NB6    | 9 NB7      | 0 NBS          | 9 NB1    | 9 SC1    | 0 SC2             | 9 SC4   | 9 SC5   | 0 200   | 9 808   | RJ1     | 0 RJZ        | B RJM   | B RJ5   | 0 RJG   | DAN 8   | G RAJ   | LAN 6   | BRAJ           | I AA1    | 9 AA2      | 9 AA3          | P AAS      |
| S        |          |             | eldmas to etaQ<br>noticellos |                  |       | 12.3.0  | 12.3.0           | 12.3.0   | 12.3.0   | 12.3.0   | 12.3.0   | 13.3.0   | 13.3.0   | 13.3.0      | 15.3.0   | 15.3.0   | 15.3.0   | 15.3.0   | 15.3.0     | 15.3.0         | 16.3.0   | 17.3.0   | 17.3.0            | 17.3.0  | 17.3.0  | 17.31   | 17.3.0  | 18.3.0  | 18.3.0       | 18.3.0  | 18.3.0  | 18.3.0  | 21.31   | 213.0   | 21.3.0  | 2130           | 26.3.0   | 25.3.0     | 25.31          | 76.70      |
| A.       |          |             | jjoo<br>auduma uo aunut      |                  |       | :10pm   | 25pm             | 40pm     | :45pm    | 50pm     | mdoo:    | mdoo     | 15pm     | mulos.      | 20pm     | :30pm    | 40pm     | mque.    | 10pm       | 20pm           | 45pm     | :10am    | 40am              | Obam    | :15am   | TO AN   | 35AM    | mq00:   | 10pm         | mdag:   | :10pm   | :15pm   | 30am    | 10am    | :35am   | :45am          | 10am     | 40.am      | :50am          | UDam.      |
|          | 1        | 5           | And a second                 |                  |       | 03      | 03               | 03       | 03       | 03       | 04       | 5        | m        | 50          | 02       | 02       | 2 2      | 2 2      | m          | 05 0           | S P      | 10       | 10                | 11      | 11      | 10      | 0       | 90      | 8 3          | 8 8     | 90      | 90      | 9 9     | t t     | 11      | 1              | 10       | 10         | 10             | - +        |
| P        |          | ormatic     |                              |                  | ords  |         |                  |          |          |          |          |          |          |             |          |          |          |          |            |                |          |          |                   |         |         |         |         |         |              |         |         |         |         |         |         |                |          |            |                |            |
| .=       | 2        | ata int     | Sample code                  |                  | stand | CB      | 0.6              | 00       | 60       | C 10     | C 12     | 5        | \$25     | 3           | 02       | C3       | 04       | 00       | C.7        | 000            | C 10     | 02       | 10                | 90      | 10      | E I     | 2 12    | Ē       | F2           | E LO    | 84      | 14      | 5 0     | 0.0     | GS      | 99             | 10       | 02         | 03             | + u        |

|         | 00            | -00           |         | °°      | -00     | 6       | 0       |         | •°°     | ;==     | °°      | -%       | 6        | °        | °°       | •        | 0°0      |          | ~        | ~        | Ŷ        | ,        | ~        | -0°0   | ~~~     |                    | ,==-,   | ~       | ~       | - 00    | 6          | s==-•   | »       | ~       |         |         | °(      | ;==-,   | °°      |         | ~~~    | 6            | »===     | °°      | ~~~     | 00      | ;=       |
|---------|---------------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|---------|--------------------|---------|---------|---------|---------|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------------|----------|---------|---------|---------|----------|
|         |               |               |         |         |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |        |         |                    |         |         |         |         |            |         |         |         |         |         |         |         |         |         |        |              |          |         |         |         |          |
|         |               |               |         |         |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |        |         |                    |         |         |         |         |            |         |         |         |         |         |         |         |         |         |        |              |          |         |         |         |          |
| 1.6     | 7.6           | 18            | 7.6     | 7.4     | 7.6     | 7.6     | 7.8     | 00      | 7.4     | 00      | 7.6     | 7.4      | 7.6      | 7.6      | 7,8      | 00       | 7.6      | 7.8      | 00       | 7.8      | 00       |          |          | 00 1   | 8       | 81                 | 7.6     | 7,6     | 4.2     | 4.8     | 4.2        | 8.2     | 8.8     | 7.6     | 2.6     | 7.8     | 7.6     | 8       | 8.2     | 7.2     | 91     | P. 0         | 0 0      | 1.0     | 82      | 7.8     | u u      |
| 7.2     | 7.8           | 7.6           | 7.4     | 7.6     | 7.6     | 7.2     | 72      | 7.2     | 7.8     | 78      | 72      | -        | 8.2      | -        | -        | -        | -        | -        | 00       | 7.8      | 1.8      | 1.8      | 1.8      | P- 1   |         |                    | 1       | -       | 5 7.6   | 00      | 7.8        | 82      | 00 0    | 0 00    | 00      | 5 78    | 7.8     | 18      | 18      | 1 20    | 00 0   | 4 4          | 4 4      | 2 0     | 80 0    | 7.6     | 7.5      |
| 20      | 40            | 40            | 40      | 20      | 20      | 20      | 20      | 20      | 20      | 20      | 20      | 200      | 100      | 100      | 100      | 100 8    | 100      | 100      | 200 8    | 100      | 100      | 100      | 100      | 200    |         | 0 40               | 10      | 5       | 5       | 5       | 5          |         |         | 0 40    | 10      | -       | 5       | 5       | 5       | 6       |        | 0 4          |          | ) u     | 0 40    | 10      | u        |
| -       | 8             |               |         |         |         |         | A       | A       | A       |         |         |          |          |          |          | A        | A        | 8        |          |          |          |          |          |        |         | 0 0                |         |         |         |         |            |         | 00 K    |         | -       | v       |         |         |         |         | •      | <b>D</b> 4   |          |         |         |         | a        |
| 61      | 4             | 00            | 10      | 6       | 4       | 0       | 0       | 0       | 0       | 0       | 1 10    | 4        | 6        | 2        | 00       | 0        | •        | 6        | 8        | 印        | 8        | 1        | 4        | Ξ.     | 0 0     | 4 00               | -       | ~       | 10      | 2       | 8          | 8       | 2       | -       | +       | 3       | 8       | 7       | 4       | 00      | •      | 0            | 8 2      | 2 3     | 0       | 2       | 0        |
|         |               |               |         |         |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |        |         |                    |         |         |         |         |            |         |         |         |         |         |         |         |         |         |        |              |          |         |         |         |          |
| 180     | 185           | 183           | 182     | 110     | 113     | 107     | 110     | 115     | 116     | 105     | 101     | 110      | 110      | 110      | 110      | 110      | 110      | 110      | 110      | 110      | 18       | 110      | 110      | 110    | 0.87    | 182                | 280     | 280     | 280     | 280     | 280        | 180     | 780     | 780     | 280     | 350     | 250     | 5       | 115     | 115     | 115    | 110          | -        | 344     | 115     | 115     | 115      |
| water   | water         | water         | water   | water   | water   | water   | water   | water   | water   | water   | water   | water    | water    | water    | water    | water    | water    | water    | water    | water    | water    | water    | water    | water  | water   | water              | water   | water   | water   | water   | water      | water   | Water   | water   | water   | water   | water   | ater    | ater    | ater    | ater   | ater         | ater     | allar . | ater    | ater    | alar     |
| Canal   | Canal         | Canal         | Canal   | Canal   | Canal   | Canal   | Canal   | Canal   | Canal   | Canal   | Canal   | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal    | Canal  | Pond    | Pond               | Pond    | Pond    | Pond    | Pond    | Pond       | Pond    | Pond    | Pond    | Pond    | Pond    | Pond    | Tap w   | Tap w   | Tap w   | Tap w  | Tan ur       | Tanua    | Table   | Tap w   | Tap w   | Tan w    |
| 55      | 5             | 82            | σι      | 5       | L       | 68      | 5       | 45      | 10      |         | 2 9     | 0        | 52       | 10       | 8        | 10       | 45       | 37       | σι       | 52       | 8        | 00       | 2        | 92     | 8.      | <b>e</b> 10        | 35      | 36      | .23     | 2       | <b>D</b> . | .52     | 0.0     | Q 40    | 10      | .87     | .62     | 39      | 10      | 5       | 20     | 8 4          | 87       | 63      | 39      |         | 50       |
| 0       | 0             | 0             | 0       | -       | 0       | 0       | 0       | 0       | 0       | 0       |         | ~        | -        | 0        | 0        | 0        | 0        | 0        | N        | -        | •        | 0        | 0        |        |         |                    | 0       | 0       | 0       | -       | ~          |         | 0 0     | 0       | 0       | 0       | 0       | abad 0  | abad 0  | 0       | 0      |              |          |         | 0       | 1       | 9        |
| Thatta  | <b>Fhatta</b> | <b>Thatta</b> | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta   | Thatta | I natta | Thatta             | Thatta  | Thatta  | Thatta  | Thatta  | Thatta     | Thatta  | Thetta  | Thatta  | Thatta  | Thatta  | Thatta  | Hydera  | Hyder   | PA      | PA :   |              |          | - Port  |         | PAH     | Hud      |
|         |               |               | 1       | İ       | ľ       | ľ       | İ       | İ       | ľ       | ľ       | ľ       | ľ        | ľ        | ľ        | İ        | Ì        | İ        | 1        |          |          |          |          |          | ľ      | Ť       | Ť                  | ľ       | İ       | İ       | Č.      |            |         | Ť       | ľ       | Ċ       |         |         | Pa      | pe      | pade    | pada.  | 0            | 1        |         |         | pe      | 10       |
| Cat     | Jati          | Uati          | (ati    | itat    | Jati    | Jati    | Jati    | Jati    | isti    | Jati    | Tat     | ist      | iter     | Ter      | Jati     | Jati     | Jati     | Cati     | Jati     | ita j    | Jati     | Jati     | - ati    | att.   |         | Hall               | Tati    | Cati    | Jati    | Jati    | Jafi       | -BF     |         |         | Cat     | Jati    | Jati    | latifab | latifab | qasim   | dasim  | Iaman I      | latifah  | Intifah | latifab | latifab | latifah. |
|         | -             |               | -       |         | _       | _       |         | -       | _       |         |         |          |          |          |          | -        | P        |          | -        | -        |          | -        | -        |        | -       |                    |         |         |         |         | -          | -       |         |         | -       | -       | -12     | fabad   | ifabad  | ifabad  | labad  | ITabad       | if shart | itshad  | fabad   | ifabad  | Fahar    |
| in Jat  | in Ja         | in Jat        | in Jat  | Jat     | Jat     | Jat     | Jat     | Jal     | Jat     | Jal     | Jal     | Jal      | Jal      | Ja(      | Jal      | Jat      | Jai      | Jat      | Jat      | 18C      | Uat      | Jat      | Uel.     | 191    | 180     | E ST               | Jal     | Jat     | Jat     | Jat     | Uat        | 18      | 191     |         | Jal     | Jal     | Jar     | lat     | lat .   | in in   |        | 181<br>Aut   | 100 tol  | 101     | lat     | lat     | 1        |
| ad Ara  | ad Ara        | ad Ara        | ad Ara  |         |         |         |         |         |         |         |         | 0        | M        | ONL      | on       | o/u      | olu      | oh       | ovir     | oli      | oft      | o/L      | oh       | on     | adid    | bipe               | adiq    | bipe    | adiq    | adiq    | adiq       | adiq    | adiq    | adia    | adiq    | adiq    | adiq    | 5       | 9       | pe      | pe -   | 08           |          | 2 2     | p p     | pe      | 1        |
| H.Arsh  | 4. Arsh       | H.Arsh        | 4.Arsh  | har     | har     | har     | har     | char    | har     | har     | har     | lib rich | lib rich | lib rich | lib rich | lib rict | lib rich | lib rich | lib rich | lib rick | lib rich | lib rich | lib rich | IP ret | Ister s | sster s<br>veter e | ester s | ester s | aster S | sster S | uster S    | sster S | aster S | ster S  | aster S | aster S | aster S | ffabad  | ifabad  | derab   | derab. | derap        | derah    | derah   | derab   | derab   | darah    |
| Ö       | õ             | 5             | Ð       | ant B   | ant B   | ant Bo  | ant B   | ant Bo  | ant Bo  | ant B.  | Int B   | H        | 1<br>L   | F        | 1        | Ta       | Ts       | Te       | F        | Ĕ        | Ĕ        | Ĕ        | Ë I      | Ë :    | ¥ :     | 2                  | W       | W       | W       | W       | W          | 2:      | 2 :     | 2 2     | W       | W.      | W       | 10      | 100     | £       | £.     | 61           | 1        | £ 3     | E 1     | 1       | 1        |
| culture | culture       | culture       | culture | Servis  | Servi   | Servi   | Servi   | Servi   | Serv    | Servi   | Serv    |          |          |          | -        | -        | -        |          | -        | -        | -        | _        | -        |        | culture | culture -          | culture | culture | culture | culture | culture    | culture | culture | culture | culture | culture | culture | e       | e       | 60      | e      | 8            |          |         | 2 1     | e       |          |
| Agric   | Agric         | Agric         | Agric   | Govt    | Govt    | Govt    | Govt    | Govt    | Govt    | Govt    | Govt    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe    | fishe  | Agric   | Acrit              | Agirik  | Agris   | Agrik   | Agnik   | Agric      | Agni    | Agni    | Acriv   | Agnie   | Agrik   | Agni    | serv    | serv    | servi   | Serv   | Serv         | 100      | 100     | Dast    | Servis  |          |
| 2 1     | 4             | 99            | *       | 4       | 2 2     | 4       | 2 1     |         | 3       | 10      | 2 5     | 1 9      | 4        | 00       | 4        | 8 2      | 3        | 4 2      |          |          | -        | +        |          | -      | 2 4     | 2 4                | 4       | 5       |         |         |            | +       | +       | +       |         |         |         | 8       | 4 2     | +       | +      |              | +        | +       | +       | t       | +        |
| -       | ~             | 12            |         |         | _       | 12      | -       | -       |         |         |         | 0        | 12       | 10       |          | 10       | 10       |          |          |          |          |          |          |        | _       | 2                  | 2       | 9       |         |         |            |         |         |         |         |         |         | 9       |         |         |        |              |          |         |         |         |          |
|         |               |               |         | Ĩ       | F       | Ť       | Ť       |         | T       | T       |         | Ť        | Ť        | Ť        | T        |          | -        |          | -        |          |          |          |          | 5      |         |                    | Ť       |         |         |         |            |         |         |         |         |         |         |         | 1       |         |        |              |          | T       |         | E       |          |
|         |               | 2             | ×       |         |         |         |         |         | S       |         |         |          |          | -        | SByo     | 2        |          |          | amma     | 2        |          | or       |          | mad D  |         |                    |         |         |         |         | dum        |         |         | khan    |         |         | ateef   |         |         | vokinar | sabir  | Libration of | Dia dia  |         |         | id Bha  |          |
| amal    | yez           | li akba       | aen bu  | hadim   | khtar   | izam    | azam    | numtar  | mir kh  | ushta   | lah din | han      | mezi     | Nukhtia  | lah wa   | ahrif    | hadim    | anish    | li moh   | llah di  | hehrab   | hahno    | ulshei   | Noham  | EMUING  | hairl              | rshad   | awab    | awa2    | ousaf   | and p      | armar   | than.   | Ousaf   | lanshe  | shad    | bdul L  | Zav     | Iunit   | Raza ki | lariam | Sasnir       | halld    | Dilatio | aleem   | Churst  | fine     |
| 10 60°  | a 60'         | B 60'         | s 60    | 3.09 k  | 3.09 a  | 3,09 n  | 3.09 n  | 3.09 п  | 3.09 a  | 3.09 п  | 3.09 a  | 3.9 k    | 3.9 п    | 3.9 1    | 3.9 8    | 3.9 s    | 3.9 k    | 3.9 d    | 3.9 a    | 3.9 a    | 3.9 n    | 3.9 \$   | 3.9 6    | 3.9 1  | 3.09 1  | 3 00 1             | 3.09 a  | 3.09 n  | 3.09 1  | 3.09 \  | 3.09 H     | 3.09 F  | 3.09 0  | N 50 E  | 3.09 h  | 3.09 1  | 3.09 A  | 4 60    | W 60    | 60      | 60.    | 80.          | 1 00     |         | S 60    | 60      | 00       |
| 7 6.3   | 7 63          | 7 6.3         | 7 6.3   | 8 15.   | 8 15.   | 3 15.   | 3 15.   | 8 15    | 3 15    | 12      | 8 15    | 20       | 8 8      | 02 6     | 8 20.    | 8 20.    | 8 20     | 8 20.    | 8        | 50       | 3 20     | 8        | 8        | 8      | 12      | 1 12               | 7 12    | 7 12.   | 12.     | 12      | 12.        | 12      | 51 5    | 12      | 12      | 12.     | 12      | 8 1.4   | 8 14    | 4       | 4      | 4 .          |          |         | 14      | 14      | -        |
| 08.03.0 | 08.03.0       | 15.03.0       | 16.03.0 | 10.08.0 | 11.08.0 | 11.08.0 | 11.08.0 | 18.08.0 | 18,08.0 | 0.08.00 | 0.90.00 | 10.03.0  | 10.03.0  | 10.03.0  | 10.03.0  | 12.03.0  | 12.03.0  | 12.03.0  | 10=5-2   | 10=5-21  | 10=5-2   | 10=6-21  | 10=5-21  | 10=6-2 | 03.03.0 | 13.03.0            | 03.03.0 | 05.03.0 |         |         |            |         |         |         |         |         |         | 15.12.0 | 06.03.0 |         |        |              |          |         |         |         |          |
| 1 65    | 410 6         | 411           | 412     | -       |         |         | Ĺ       |         |         |         |         | F        | 22       | 100      | 54       | 52       | 36       | 27       | 82       | 62       | \$10     | H        | 812      | 813    | 15      | 70                 | S4      | SS      | S6      | S7      | 88         | 88      | S10     | 512     | S13     | S14     | S15     | 10      | 102     | ŝ       | 20     | 200          | 20       | 040     | 00      | VD10    | 1044     |
| A 60.   | A 60.         | A 90.         | A 60.   | B 60    | 09 B    | 00 B    | 09 B    | 00 B    | 09 B    | 00 B    | 00 B    | 00 T     | T 60     | T 60     | 09 T     | TI 60    | 09 TI    | 11 60    | E 60     | E 60     | 11 60    | F 60     | E 60     | E 60   | W 50    | W AD               | M 60    | M 60    | M 60    | W 60    | W 60       | W 60    | W 60    | N 00    | W 60    | W 60    | W 60    | H 60'I  | H 600   | H 60    | H 80   | H 80         |          |         | L BO    | H 90    | 1 22     |
| 26.3    | 26.3          | 26.3          | 26.3    | 27.3    | 27.3    | 27.3    | 27.3    | 273     | 273     | 27.3    | 273     | 14       | 14       | 14       | 1 14     | 14       | 14       | 14       | 14       | 2.4      | 2.4      | 1 24     | 2.4      | 2.4    | 7.4     | 7.4                | 74      | 7.4     | 7.4     | 7.4     | 7.4        | 8.4     | 8.4     | 8.4     | n 8.4   | 8.4     | 8.4     | 16.4    | 16.4    | 16.4    | 16.4   | 16.4         | 10.4     | 101     | 17.4    | 17.4    | 11       |
| 50am    | .58am         | -20pm         | :30pm   | .45am   | 55am    | .00am   | -15am   | -20 am  | .30am   | -35am   | ment.   | Obom     | 2001     | 30mm     | .40pm    | . 45pm   | : 55pm   | : 05pm   | : 05pm   | : 20pm   | : 30pm   | : 40pm   | : 45pm   | . 55pm | HOpm    | HOUDE              | 30pm    | :45pm   | :15am   | :30am   | :40am      | :45am   | :15am   | RDam    | DONIOO  | :30am   | :35am   | :10am   | :35am   | :00am   | :10am  | :30am        | TIEUP:   | URCI.   | TEO3    | -20am   | The form |
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| 60      | 0.10          | 011           | 0.12    | AB1     | 4B 2    | 483     | AB.4    | AB 5    | AB6     | AR 7    | ABS     | E I      | 82       | 83       | 84       | 86       | B6       | 87       | 80       | 88       | B 10     | 81       | 812      | 813    | AI      | 42                 | 44      | A5      | A6      | A7      | A8         | 49      | A 10    | A 12    | A 13    | A 14    | A 15    | ш       | Ē       | E2      | E3     | E4           | -        |         | 100     | 5       | 110      |
|         |               |               |         |         |         |         |         |         |         |         | T       |          |          |          |          |          |          |          |          |          |          |          |          |        |         |                    |         |         |         |         |            |         |         |         |         |         |         |         |         |         |        |              |          |         |         |         |          |
|         |               |               |         |         |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |        |         |                    |         |         |         |         |            |         |         |         |         |         |         |         |         |         |        |              |          |         |         |         |          |



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# 100 ReTest of N.F units from 11 Villages of Thatta district

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# Turbidity of 100 N.F test from 11 Villages of District Thatta

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#### 9. Analysis of the results

The test report shows that the filter water of bio sand nadi filter is fit for drinking ,it removes not only turbidity but also faecal coli forms has been removed by the filtration. It is very beneficial and safe filter; it is not much expensive this is the gift of God that by natural things, we can filter the water without mixing of any chemicals.

The effectiveness of bio sand Nadi filter is 100%. These results indicate that how much fecal coli forms removed during filtration. This report made after practical testing of filters by AHD. The fecal coli forms reduced or removed from 95-99% during filtration, in the above data sheet it shows that in canal water or in hand pump water the number of fecal coli forms present. But bio sand Nadi filter water removed the fecal coli forms. The other indicator is that the area where AHD installed this bio sand Nadi filters the diseases

#### 10. Sand filters ripening / maturation period

Bio-Sand Nadi filter units first installed in village / community at household it is effective to clean the turbidity up to 98 to 100% but it is not effective to remove germs/viruses during the first 1-5 days. The results of removing faecal coli forms are as under:

During First week to 2<sup>nd</sup> week of Nadi filter installation the microbes alive in the Nadi filter and water become rich to clean viruses and bacteria

The approach to designing this filter was to look at water purification from a "no funds" perspective in the hope that development would be started that could sustain its self without funding or external intervention.

"All people need is the filters design details and the will to use it"



"God Created good bugs to eat the bad bugs"

In small numbers they are already present in all dirty water actively destroying the germs. They cost nothing and are freely available to all.

### Performance and Zoology of the filter

#### "Good Microbes"

The active biology assembles its self in a series of layers. The uppermost is called the schmutzdecke.

This includes:

- threadlike algae
- plankton,

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- protozoa
- bacteria

They effectively remove:

- Parasites including:
- Giardia
- cryptosporidium
- Viruses including
- faecal coli form
- $\bullet$  cholera
- typhoid fever
- amoebic dysentery
- Bacteria including
- iron / sulphur bacteria (slimy deposits)
- Chemicals including:
- iron
- manganese (rust, stains, metallic tastes)
- hydrogen sulphide (rotten egg smell and ot
- toxins
- pesticides
- herbicides
- heavy metals (leads)
- silt and sediments
- algae



Lab test on local canal water show 320 thermo-tolerant faecal coli form per 100ml



Test on the same water after passing through the Filter show only 1 T.F.C per 100ml

#### 11. Sand carry microbes or useful bacteria



The sand contains good microbes or good bacteria alive in upper layer of sand in Nadi filter and do not dry the sand otherwise all microbes will die the water should remain in Nadi filter uop to 4-5 inches.

#### 11.2 Sand needs to be refreshed / water wash

Once the Nadi filter is made or installed it works up to 3 to 4 months if the family members are small and water is filtered once a day means only 1 to 2 gallons of water is

being filtered. The major indication was the flow of water comes through the pipe. When the flow come low or slow means it needs to wash 3 inches of the upper layer of the sand and again put in to Nadi and the filter will be ready again.

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If the family members are more means up to 08 to 16 that means filter needs to wash 3 inches upper layer of the sand in every 1 to 2 months. But some time it works more as the turbidity is less in source of water is being filtered.



12. Acceptability of Nadi filter units in local rural communities

During the survey and research study the views of the village women representatives are very remarkable as they said that now they have opportunity to have safe and clean drinking water at their door step and they can put canal water and hand pump water to filter for the drinking purposes. The whole family is happy and since March 2008 they are using Nadi filtered water and now they are habitual and do not drink canal water or hand pump water as they are asking that the canal water and hand pump water is the polluted water and Nadi filter water is only the safe water for us.

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Even all women, children, male and female young persons get interest and made Nadi filter units at their household level and also learned the technology to use on sustainable basis in future.



#### 13. Material Marketing and availability

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Material of Nadi filter units is available at any where in Pakistan, where ever the mud pot is been made and in use. There is need to show or introduce Nadi to the local vender and than they will be able to make new Nadi filter pot.

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At Present Nadi filter material is abundantly available at Hyderabad, Mirpurkhas, Matli, Badin, Thatta, Nawabshah, Sukkur, Jacobabad, Dadu and Karachi. During our trainings in the South Punjab and Balouchistan our staff see the mud pots every where and that can be used to make filters.



During our work in Jati area since 2006-2007 we installed so far 1500 units in rural communities in Jati, Sujawal, Gularchi, Matli, Hyderabad and Jamshoro districts and we find Nadi material every where in the said areas.

But in South Punjab the Nadi material is available but it needs some modification and training to produce standard Nadi at South Punjab in this regard Doaba Foundation is working to promote skills and Nadi filter units in Multan, Layyah and Muzfargarh areas.

#### 14. Visits of CBOs/ NGOs and Donors / Partners during research study period:

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|| % Since the Nadi filter testing study conducted many NGOs, GOs and Donors visited filed areas to see the results and performances of Nadi filter units at filed level. The guests from ADP, County NGOs Director USA, SDPI Islamabad, NGORC staff Karachi, SRSP, German Counslate Gernal Kararchi and Misereor Germany staff.

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While Oxfam GB Pakistan staff engaged with our Research Associate to conduct tests and trainings of AHD staff.

#### 15. Cost making one Nadi filter unit

### Cost of making a Nadi Filter

| 32-34 inch Nadi | 250 Rs | - | 350 Rs                  |
|-----------------|--------|---|-------------------------|
| *20 inch Nadi   | 150 Rs | - | 200 Rs                  |
| Mattaka         | 60 Rs  | - | 70 Rs                   |
| Sand            | 30 Rs  | - | 40 Rs                   |
| Pipe            | 50 Rs  | - | 60 Rs                   |
| Cement          | 25 Rs  | - | 35 Rs                   |
| String          | 40 Rs  | - | 50 Rs                   |
| *Bricks         | 30 Rs  | - | 35 Rs                   |
| Total           | 635 Rs | - | 840 Rs Typically 750 Rs |

#### **16. BASELINE SURVEYS AND VIEWS OF COMMUNITY MEMBERS**

#### **Survey Reports / Visits Details**

The survey forms filled in 10 villages to see the importance and effectiveness of the Nadi filter units provided to the community and using for drinking purposes at household level the questions asked to the community in survey format.

The surevy format we used to collect Nadi filter users information:

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#### Association for Humanitarian Development (AHD)

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| ame of village / Are                                                                                           | Mada               | Seclie            | ~          | Date                                                                                                           |                      |
|----------------------------------------------------------------------------------------------------------------|--------------------|-------------------|------------|----------------------------------------------------------------------------------------------------------------|----------------------|
| the khaut                                                                                                      | Taluka             | Jal               |            | District                                                                                                       | Thatta               |
| Il Name of user                                                                                                | Mire S             | hanno             | Mei        | ushe                                                                                                           |                      |
| ousehold Informatio                                                                                            | n.                 |                   | 2          |                                                                                                                |                      |
| 1. How many fa                                                                                                 | mily members?      |                   |            |                                                                                                                |                      |
| Total 9                                                                                                        | Male S             | Female            | 4          | Children                                                                                                       | 5                    |
| 2. How much tir                                                                                                | ne ago vou are us  | ing Nadi filte    | er water?  |                                                                                                                | 10                   |
| One year                                                                                                       | Five yea           | urs Five J.       |            | above                                                                                                          |                      |
| 3. Which source                                                                                                | of water you wer   | e usino befor     | re Nadi fi | ilter water?                                                                                                   |                      |
| Walls Han                                                                                                      | d nummer W/a       | ton source of the |            | de la compañía de la compañía de la compañía de la compañía de la compañía de la compañía de la compañía de la | N. N. 45             |
| weas Hall                                                                                                      | u pumps wa         | ter reservoir_    | pon        | oscana                                                                                                         | als water_P_         |
| <ol><li>Has any mem</li></ol>                                                                                  | ber of family suff | ered in follow    | wing dise  | ases after use                                                                                                 | e of Nadi filter wat |
| (1) Diarrhea                                                                                                   | Yes No             |                   |            |                                                                                                                |                      |
| (2) Skin diseases                                                                                              | Yes - No           | h                 |            |                                                                                                                |                      |
| (3) Cholera                                                                                                    | Yes No.            |                   |            |                                                                                                                |                      |
|                                                                                                                |                    |                   |            |                                                                                                                |                      |
| <ol><li>What changin</li></ol>                                                                                 | g you felt in your | family after      | use of Na  | adi filter wate                                                                                                | er?                  |
| Good Good Ba                                                                                                   | dSom               | ething            | No         | thing                                                                                                          |                      |
| 6. Which differe                                                                                               | nce you felt about | Nadi Filter       | water and  | f common wa                                                                                                    | ater?                |
| Good Good Ba                                                                                                   | d Some             | ething            | Not        | nine                                                                                                           |                      |
|                                                                                                                |                    |                   |            |                                                                                                                |                      |
| <ol><li>Are you satisf</li></ol>                                                                               | ied about safe dri | aking water o     | of Nadi fi | ilter for save                                                                                                 | from water born      |
| Yes Yes No                                                                                                     |                    |                   |            |                                                                                                                |                      |
| 8. Do you want u                                                                                               | ise of Nadi filter | water continu     | iously?    |                                                                                                                |                      |
| Yes yes                                                                                                        | No -               |                   |            |                                                                                                                |                      |
|                                                                                                                |                    |                   |            |                                                                                                                |                      |
| Name of Supervi                                                                                                | sor: Maari         | ann Sal           | ne         | Sig                                                                                                            | nature : M           |
| State of the second second second second second second second second second second second second second second | 21.                |                   | 1000       |                                                                                                                | Æ19                  |
| Name of Project                                                                                                | Officer : Ola      | 7.Ch              |            | Sign                                                                                                           | ature :              |
|                                                                                                                | 6                  | 6                 |            |                                                                                                                | A. Klaudil           |
|                                                                                                                |                    |                   |            |                                                                                                                | a image of           |
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#### 16.2 Case Studies:

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#### 1. Ms. Sarfin Mansha

**Ms. Sarfin Mansha** is the resident of village Master Sadiq, she is 20 years old, and she lived with 10 family members 6 male and 4 female. She is contributing with her mother

in house and agricultural land work. She said for the drinking water every day she traveled 2-3 times to collect water from nearby hand pump. But sine last 2 years now she happy as the Nadi filter unit installed at their house and she have no extra burden to collect water from outside.

She is happy because of using Nadi filter, she said that our health is getting better and our expenses on diseases are saved now due to decreased in diseases. She further told



that before use of Nadi filter water they were using canal water and suffering from many water borne diseases like diarrheas, skin diseases and choleras etc. she told us that not only they like the clean water but its taste is good and now I ma drinking g more water as compare to previous I was drinking very limited glass of water due to bad taste. She is happy and praying for AHD staff and organization to continue such work for other peoples also as the nearby village communities needs it.

#### 2. Mrs. Hamida Ayub

Mrs. Hamida Ayoub is the resident of Wahdat Colony near Hyderabad, she lived 6 family

members contains 3 male and 3 female with 1 child. Mrs. Hamida Ayoub says since one year ago we are using Nadi filter, the water we use to drink is coming from tape water.

when we started to use Nadi filter, he argued that Nadi filter is such a filter which provides us clean water and because of that clean water improved our health our family save from water born diseases like diarrhea, cholera and skin



diseases etc good changes has came in our family he said that there is much difference in nadi filter water and common water Nadi filter makes water free from all bad bugs which create disease he cleared that me and my family is completely satisfied from nadi filter continuously we will use Nadi filter and get benefits to all family.

#### 3. Ms. Fatima Kaleem

Ms. Fatima Kaleem lives in village Talib Richo since last many years and she have 7

members in her family, 3 are males and 4 are females. She told us that before installation of Nadi filter units we are suing canal water which is taste less and also harmful for us but as we have no option to drinking or find safe drinking water.

She told us that in the month of March 2008 AHD staff came to visit our village and conducted one meeting in which they share the Nadi filter drinking



water techniques. I learned and share with my husband and we both decided to make Nadi filter at our home. Thanks to AHD staff they trained us and given the material at our doorstep and we make our own Nadi filter unit. We are happy to have facility for drinking safe and clean drinking water at household level and now myself and my husband skilled to make our own filter at any time without any help of AHD staff.

#### 4. Ms. Katherine Gill

We have surveyed some Nadi filter user in Hyderabad and one of the user name is Ms.

**Katherine Gill** she lives in Latifabad # 10 and she have 7 members in her family, 3 are males and 4 are females. She told us that there are using Nadi filter from last one year.

She told us because of using Nadi filter our health is getting better and our expenses on drinking water are decreased. On our one question she told that before use of Nadi filter water they were using tap water and suffering from many water born diseases like diarrheas, skin diseases



and choleras etc. she told us that not only they like the cleanness but also like the taste and in the last when we asked the are they willing to continue use of Nadi filter water she replied confidently yes definitely. In the end she thanked to AHD staff members for introducing the Nadi filter.

#### 17. Outcomes of the Research Study

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The benefits to quality of life provided by the filters are substantial.

- The filters improve the health of families especially women and children showed greater satisfaction on installation of filters in their houses. It enables them to escape the vicious cycle of poverty that hampers economic and social development for individuals, communities and entire nations. During field visit to several villages from Sept 2008 to April 20<sup>th</sup> 2009 the following was shared by women beneficiaries. "Life has changed especially for us because of the Nadi water filter," she further adds that "we don't have to walk anymore to find safe water or to buy it. We have felt the change in the water we now drink. We cannot simply drink the water from the canal/hand pump if we don't filter it, because it hurts our stomachs and makes us vomit, and it even makes me dizzy. This is where we've been able to prove that the filters really do work. We accept that Nadi filters are a blessing from God that has come to us here through AHD staff."
- Apart from this it also increases the poor people's access to safe drinking water would resulting in major economic and social benefits. Studies have shown that the filter can reduce diarrheal illnesses by up to 80% including skin diseases, which has a tremendous impact on the overall health and productivity of a family and entire communities. A woman reflected that "The canal water is very contaminated," she confirms, noting she and her family used to be plagued by diarrhea, dysentery, and skin problems. "We had to spend a lot of money on medicines."
- Work productivity and school attendance increase due to fewer sick days, and improved health means families are able to spend less of their meager incomes on medicines, improving their overall quality of life. The environmental outlook of communities is improved especially, where the filters are used and trainings provided by project staff related to health and hygiene.
- Some Nadi filters are maintained by men as well, this challenges gendered division of labour within household, where managing water is solely a women's responsibility.

#### **18.Key Points for Sharing Knowledge**

- Nadi Filter has great potential to be introduced in other remote areas. But its scale up requires collaboration in local, multi-national, national and international organizations.
- Experience shows once communities are use to of drinking filtered water, avoid consuming contaminated water anymore.
- Mobilization and awareness trainings play significant role in improving health and hygiene related practices in communities

- A real sense of ownership and participation by both women and men can help in its extension and sustainability
- Due to use of mud pots water remain cool even in extremely hot weather conditions. If it is placed in appropriate place/under shadow, away from direct sun light.
- Nadi Filter are proved to be more effective at household level rather than community
- Even children are happy and showing their interest to have safe and clean drinking at their door step and now they drink more water as compare to past.
- Some farmers carrying bottles of the Nadi filtered water with them and they are asking that the canal or hand pump water is taste less now and they do not drinking dirty water.
- It has multiple advantages:
- *1*; Reduces diarrhea stomach aches, skin infections, urinary tract, infections, Water borne disease,
- 2; Removes turbidity color and order from water,
- 3. Requires minimal maintenance and
- 4. Constructed from local material.
- 5. Available at any where, cheap and easy
- 6. Quick Bio-Sand filter means in 1 hours water flow is 15 to 20 liters per hour

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