Report

Subject: **Orders dated 20.04.2022 passed by Hon'ble NGT in OA No. 187/2022 titled as Pritam Singh & Ors. V/s State of Himachal Pradesh.**

1.0 Preamble:

The Hon'ble National Green Tribunal Principal Bench vide order dated 20.04.2022 constituted a five Member Joint Committee comprising of CPCB, CGWA, Punjab State PCB and District Collectors of District Ropar(Punjab) and Una (Himachal Pradesh) respectively.

The relevant para of said the Hon'ble NGT order, pertaining to the mandate of the committee is reproduced hereunder:

1. *Mr. Pritam Singh and other residents of Gram Panchayat Malukpur, Sanoli, Majara, Veenewal, Sub-Tehsil Mehatpur Basdehra, District Una, Himachal Pradesh have sent the present letter petition to this Tribunal complaining that Punjab Alkalis Chemical Ltd., a red category industry, at Naya Nangal, District Ropar Punjab is discharging untreated highly polluted chemical effluents in their land adjoining the above said industry contaminating the groundwater. Due to contamination of groundwater, their agriculture lands have become uncultivable. The water samples drawn from their 7/8 wells/tubewells and deep bore tubewells of Himachal Pradesh Government were found to be unfit for irrigation/drinking due to which the said tubewells had to be abandoned/closed. The inhabitants of Malukpur and Veenewal villages have to drinking water from other villages. It is further stated that gas leakages from said industry occur frequently causing air pollution and also posing serious risk to lives of the inhabitants. It is further stated by the applicants that the applicants had filed Civil Writ Petitions bearing no. CWP 6931 of 1994 and CWP 16748 of 2015 in Hon'ble Punjab and Haryana High Court but despite orders passed on the said petitions, no action has been taken by the PSPCB for abatement of environmental pollution. On the other hand, despite objections by the inhabitants, said industry was allowed to make captive thermal plant functional aggravating the environmental pollution.*

2. *In view of the serious allegations made in the letter Petition that the Punjab Alkalis Chemical Ltd is causing transboundry pollution in Himachal Pradesh and Punjab, it would be appropriate to have a factual and action taken report in the matter. Accordingly, we constitute a Joint Committee comprising of representatives of CPCB, CGWA, Punjab State PCB and District Collectors of Districts Roper and Una respectively. The State PCB will be the Nodal agency for coordination and compliance. The Joint Committee may meet within four weeks, undertake site visit, look into the grievances of the applicants and take requisite action by following due process of law. Factual and action taken report particularly with regard to compliance with consent conditions may be furnished within two months by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF.* ***List the matter for consideration on 14.07.2022***

2.0 Brief status of the industry (PACL)

The committee constituted by the Hon'ble NGT held a meeting at Nangal on 02.06.2022 to deliberate on the issue. All the details about the industry were perused and it has been noted that the industry is a Chlor-Alkali plant established in the year 1984. The industry is using Industrial Salt, Barium Carbonate, Soda Ash, Sodium Bisulphate, Sulphuric Acid, Alpha Cellulose, Flocal as raw material and is manufacturing Caustic Soda Lye, Chlorine Gas and Hydrogen Gas. The brief manufacturing process is as under:

Raw Material→ Manufacturing of Brine Solution→ Removing of Impurities→ Brine filtration→ Electrolysis→ Hydrogen Separation→ HCL Production→ Sodium Hypochlorite production by scrubbing of chlorine with caustic soda.

Further, the industry has obtained Environmental Clearance from MoEF&CC for expansion of Chlor-Alkali Plant, and the details of expansion are as under:

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Sr. no.	Product/Plant	Capacity (TPA)		
		Existing	**Proposed**	**Total**
1.	Caustic Soda Lye	99000	165000	264000
2.	Hydrogen gas	277.2	462	739.2 Lakh/Nm^3
3.	Caustic Soda Flakes*	---	66000	66000
4.	Stable Bleaching Power*	---	33000	33000
5.	Liquid Chlorine	87714	146190	2,33,904
6.	Hydrogen Peroxide*	---	16500	16500
7.	Captive Power Plant	---	75	75 MW
By-Product				
1.	Hydrochloric Acid	39600	66000	105600
2.	Dilute Sulphuric Acid	2100	3500	5600
3.	Sodium Hypo Chlorite	2000	4000	6000
**Products not requiring EC*				

Beside above proposed expansion, the industry has obtained NOC from the Board for manufacturing of Aluminium Chloride @ 50 TPD with special condition to obtain prior EC from the Competent Authority before initiating its installation.

The industry is using canal water supply for meeting the various requirements for industrial purpose and domestic purpose within the industrial premises and residential colony. The industry generates trade effluent from regeneration from regeneration of ion exchange, gland cooling water, cooling towers' blow down, boilers' blow down, and floor washing etc. The trade effluent is collected in 2 nos. collection tank from where the same is pumped to treatment facility i.e. ETP followed by RO plant of capacity 300 m^3/day with Multi Effect Evaporator (MEE) of capacity 45 KLD. The RO permeate is being re-used in the process (cooling towers). Further, the results of the last 03 years of the effluent samples collected

from the outlet of the ETP by the Board were also placed before the committee for perusal.

The industry has installed two no. boilers of capacity 5 TPH and 10 TPH. The industry uses hydrogen gas as fuel and furnace oil is also used in these boilers at the initial firing stage. The industry has also installed 01 no. of Husk fired boiler of capacity 8 TPH and has provided bag house filter as APCD. The industry has two no. HCl plants of capacity 120 MTD each which are equipped water sprinkling system as APCD. The industry has two no. hypo manufacturing units of capacity 24 MTD and 12 MTD, both these hypo units are separately equipped alkali scrubber as APCD. Further, the results of the last 03 years of the stack emission samples collected by the Board were also placed before the committee for perusal.

3.0 Scope of the Committee:

The Joint Committee has been asked to meet within four weeks, undertake site visit, look into the grievances of the applicants and take requisite action by following due process of law. Factual and action taken report particularly with regard to compliance with consent conditions may be furnished within two months, as directed by the Hon'ble NGT vide order dated 20.04.2022.

3.1 Site visit of the unit on dated 02/06/2022

A site visits of the M/s Punjab Alkalis Chemical Ltd., Naya Nangal, District Ropar Punjab was carried out on 02/06/2022. During visit, the unit was operational and expansion work of the unit also found under progress. During the site visit the unit representatives provided the documents and technical inputs to the committee during discussion.

3.2 Interaction and discussion/meeting with the complainant:

The committee visited the unit premises on dated 02/06/2022 alongwith the complainants and many other residents of nearby villages. The committee has interacted with local resident representatives and heard the petitioners on 02/06/2022 at M/s PACL unit premises and also met brother of the petitioner Sh. Pritam Singh who is the holder of power of attorney to represent the committee as the petitioner was not available. Local residents informed that he has left for

abroad. The Committee has listened to their grievances in the presence of the unit representatives. The committee along with local residents' and complainants also visited the plant premises and checked its various sections to know the fact of pollution in the unit premises. The committee also discussed various issue with the local residents-cum-complainants, during the meeting.

3.3 Feedback from the Villagers and Representatives and applicant: The committee took feedback from the villagers and they informed that the unit frequently releases toxic gas which cause problem in the downstream villages. Further reported that the unit is expanding its plant and has installed in house captive power, and the cause of air pollution cannot be ruled out in future. The villagers also reported that ground water and soil of adjoining villages are being polluted due to the unit's effluent and emissions. The villagers demanded that they desire water supply for drinking water as well as irrigation water of the canal from the industry.

3.4 Compliance verification of consents conditions and also verification of Environmental clearance conditions was carried out during visit.

3.5 As per protocol, ground water samples from adjacent villages located in the district Una and Punjab boundary were carried out on 03/06/2022.

3.6 As per protocol, soil samples from units' backyard Agricultural fields were also carried out on 03/06/2022 on demand of villagers present on spot.

4.0 Salient Observations:

As per the observations by members of committee from CPCB & PPCB, the following was observed:

1. On the day of inspection, the unit and its ETP was found operational.
2. During visit, the committee carried out inspection of various sections of units ETP plant, membrane cell house, Hypochlorite section, Paraffin wax section others.
3. The unit is meeting its water requirement through surface water from river Sutlej. As reported the unit obtained NOC from Department of Water Resources Government of Punjab.

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4. The effluent generated from regeneration of Ion exchange, Gland cooling water blow downs of boilers & cooling towers and floor washing etc. is en-routed to ETP through open conveyance channel.
5. The unit has installed ETP of 300 KLD capacity which is based on (Zero Liquid Discharge (ZLD) for treatment of the trade effluent generated from process. The ETP is comprised of Collection Tank > Neutralization Tank > R.O (Capacity 300 m3/day) > Multiple effect evaporator (three stage falling film MEE of capacity 45 m3/day) > Sludge Drying Beds.
6. During visit committee observed, no effluent is being discharged outside the premises of the unit.
7. The unit has installed online effluent monitoring system at final outlet of ETP for measuring flow, pH, TSS, COD, BOD and its connected to CPCB/PPCB server.
8. On the day of inspection, OCEMS value were observed as follows: pH-8.55, BOD-3.36 mg/l, TSS-12.73 mg/l, COD-33.35 mg/l.
9. The unit has installed chlorine sensors at various locations in the plant premises namely at the boundary, Hypo Plant, Cell Houses, Utilities, HCL Plant, Chlorine filling and Chlorine Storage, and CPW Plant namely (M/s Flow Tech) for monitoring of chlorine emissions.
10. The unit has installed online sensor at sodium hypo plant for measuring chlorine as well as HCL fumes, and the sensors are connected to CPCB/PPCB server.
11. The unit possesses valid consents under the Water Act, 1974, The Air Act, 1981 and Authorization under the Hazardous and Other Wastes (Management and Trans-Boundary Movement) Rules, 2016 from the PPCB.
12. During inspection, Committee observed that the unit has made garland drain around the brine sludge disposal pit for collection of the leachate and as reported it sends to ETP inlet for further treatment.
13. The unit has installed four piezometer wells around the old brine disposal pit for monitoring of the ground water quality.
14. During visit, team observed that R.O permeate is reused in-house as cooling towers make-up water.

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15. The unit has installed electromagnetic flow meter at final outlet of the ETP and with the recycling line, and the record for the same is being maintained.
16. The unit has installed separate energy meter for ETP and records of the same also maintained.
17. The unit has maintained Log book of ETP Chemical consumption.
18. During visit, committee observed that the brine sludge generated from brine purification process is disposed-of at secured lagoon which is non-hazardous waste in nature. However, The ETP sludge is temporarily stored at in-house storage area and is periodically taken by operator of Common Hazardous Waste Treatment, Storage and Disposal Facility at Derabassi (operated by M/s Ramky Enviro Engineers Ltd) for final disposal.
19. The unit has provided three DG sets of capacities 500 KVA x 2 and 525 KVA. These are equipped with acoustic enclosure and also sufficient exhaust pipe for vent out emissions into atmosphere.
20. The unit has installed two boilers of capacities 5 TPH and 10 TPH for producing steam using hydrogen gas as fuel and furnace oil is also used in these boilers at the initial firing stage. The emission is vent out to atmosphere through stack of 45m height.
21. The unit has also installed one husk fired boiler of capacity 8 TPH and its emissions are vent out to atmosphere after passing through bag-filter as APCD.
22. The unit has installed two HCL plant of each capacity 120 MT/day which are equipped with water sprinkling system as APCD.
23. The unit has installed two hypo manufacturing units of capacity 24 MT/day and 12 MT/day. These Hypo units are provided with individual alkali scrubber as APCD.

5.0 Sample Collection

In compliance of NGT order, the Joint committee has taken ground water samples from Irrigation and Public Health Department borewells operated in the adjoining villages in boundary of Una (HP) as well as Punjab on 03/06/2022 in the presence of representatives from nearby villages. These samples were collected and analyzed by Central Ground Water Board (CGWB).

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On request of villagers, the committee has also taken soil sample from agricultural fields in close proximity to M/s PACL unit in the presence of the village representatives. The Soil sample was jointly collected by Punjab & Himachal Pradesh Agricultural department to verify the status of the soil. As per committee decision the soil samples were collected on 03/06/2022 and was made homogeneous as per protocol. The sample was divided into two parts. One part of soil sample was sent to Palampur Agriculture University (HP) for testing while the other part was sent to State Soil Testing Laboratory in Punjab.

During visit, the sample collection team has observed that the plot adjoining to PACL boundary wall was found uncultivated while the adjoining fields around the industry were filled with vegetables (namely Water melon, Cucumbers, Tomatoes). The 80 (eighty) photographs from the adjoining fields to the industry taken during the visit are enclosed as **Annexure-A**. It was also observed that 03 out of the 08 tubewells from where samples were collected were located within close vicinity of waste water bodies/ stagnant water.

6.0 Monitoring and Analysis of Ground Water and Soil and Verification of Consent Conditions

Taking into consideration the main allegations/grievances, the committee focused on following major areas:-

- **Compliance of the consents and other clearance's conditions.**
- **Quality of ground water.**
- **Quality of soil.**

The discussion/observation of the committee in reference to above is discussed in the following paras:

6.1 Compliance of the consents and other clearance's conditions.

The industry has obtained all the necessary clearances, viz-a-viz Environmental Clearance, Consent to Operate under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 and Consent to establish for its expansions etc. The compliance of the various conditions imposed in the clearances granted to the industry were verified by

members from CPCB & PPCB. As per their conclusions, the industry is complying with all the conditions and is meeting with the standards prescribed for discharge of effluent and emissions. The industry was found to be operating its unit on "Zero Liquid Discharge" (ZLD) system on the day of inspection.

6.2 Quality of ground water.

The quality of shallow/deep ground water in the surrounding area up to a distance of about 3 sqkm. of industry has been studied and 8 number of water samples were collected from shallow/deep aquifers on 03/06/2022 by CGWB. All the collected samples were analyzed by adopting standard methods of analysis (BIS & APHA) in the Regional Chemical Lab of CGWB. The results by the Central Ground Water Board, Chandigarh are annexed as **Annexure-B.**

6.2.1 Observation/Comments of CGWB

By email dated 22.06.2022 CGWB has intimated the following observations which are reproduced in verbatim:

"Colour

Colour of ground water from all the tube wells is transparent and clear.

Specific Conductance (EC)

The acceptable limits of Electrical Conductivity for drinking water is 1000 µs/cm (corresponding TDS approx. 600 mg/L) and 3000 µs/cm is permissible if any alternative source of drinking water is not available (TDS is 2000 mg/lt). In the samples collected, the Electrical Conductivity varies between 653 µS/cm at 25°C to 1285 µS/cm, which is less than permissible value (below TDS of 2000 mg/L)

pH

In the study area pH values of ground water ranges between 7.12 to 7.66, which is within the permissible limit of 6.5 to 8.50 as per BIS 10500:2012.

Chloride Concentration

The concentration of Chloride in all samples varies from 14 mg/L to 210 mg/L which is within the permissible limit of 250 mg/L to 1000 mg/L as per BIS 10500:2012.

Fluoride Concentration

In all the samples Fluoride concentration varies from 0.09 mg/L to 0.26 mg/L which is well below the permissible limit of 1.5 mg/L as per BIS 10500:2012.

Nitrate

Nitrate is another parameter considered for identification of contamination. Presence of the Nitrate in ground water indicates the contamination from the sewage waste, agricultural waste and organic waste. There are many sources of nitrate in ground water, such as improper disposal of domestic and sewage waste, waste from animal farms, use of nitrogenous fertilizers etc. Since crop utilizes only 25 to 71 per cent of total nitrogen fertilizers, rest of it either remains in the soil or is lost from the soil-plant system through leaching, denitrification or ammonia volatization. A significant amount of applied fertilizer move into deeper layer of soil due to percolation as nitrate and ultimately joins the groundwater.

Nitrate concentration in all the tubewells is found between 13 mg/L to 33 mg/L. The presence of nitrate in these samples may be correlated to the extensive agricultural activity and vicinity of waste water body/stagnant water rich in organic matters around the tubewells or the recharge area of tubewells. All the samples have nitrate within permissible limit i.e. less than 45 mg/L as per BIS 10500:2012.

Trace/Heavy Metals

The samples were analysed for the presence of trace/heavy metals viz. Cr, Mn, Ni, Fe, Se, As, Zn, Cd, Cu, Pb, U, Ag. Some of them if present in excess quantities are dangerous for human health and also for vegetation. In the collected samples all these metals found within the permissible limits as per BIS 10500:2012.

Irrigation suitability

The suitability of ground water for irrigation is mainly assessed through Sodium Absorption Ratio (SAR) and Residual Sodium Carbonate (RSC) values.

The SAR is an irrigation water quality parameter used in the management of sodium-affected soils. It is an indicator of the suitability of water for use in agricultural irrigation as determined from the concentrations of the main alkali (Na)

Jagdish

and alkaline earth (Ca & Mg) cations present in the water. On the basis of SAR range, irrigation water can be classified into four classes as SAR < 10 (ideal or excellent), 10–18 (good), 18–26 (doubtful) and > 26 (unsuitable).

All the samples collected are having the values of SAR in the range of 0.34 to 1.13, hence falling in the ideal or excellent category for irrigation use.

The Alkali hazards of irrigation ground waters are estimated through the computation of Residual Sodium Carbonate (RSC), also known as Eaton's Index. Waters with RSC value <1.25 meq/L are safe for irrigational uses, RSC between 1.25 and 2.5 are marginal and waters with RSC value >2.5 meq/L are unsafe. All samples in this study are found to be in safe category.

Drinking water supply in the villages

Ground water samples from water supply tubewells in Gram Panchayat Malukpur, Sanoli, Majara, Veenewal have been collected and analysed. All the parameters analysed are under the permissible limits of drinking water standards. The water supply in all the villages surrounding the industry is based on ground water from deeper aquifers which is being supplied by Jal Shakti department of Government of Himachal Pradesh and DWSS of Government of Himachal Pradesh. As the ground water of deeper aquifers are meeting the standards prescribed by BIS (ISO10,500 of 2012) which is being supplied for drinking and domestic water requirements by piped water system.

Observation:

In view of the concerns raised about the suitability of ground water for drinking and irrigation purpose, it is observed that based on the parameters analysed in the CGWB laboratory, samples conforms to the BIS 10500:2012 (Drinking Water Specification) hence suitable for drinking purpose, also based on SAR and RSC values the ground water is suitable for irrigation purpose also."

7.0 Quality of Soil

It was decided by the joint committee to collect Soil Samples from the nearest villages to assess the quality of soil in the vicinity of the industry. As such, a composite sample was collected and was divided into 02 parts. One part was analyzed by the Department of Agriculture, Himachal Pradesh and the second

Jagdish

part was analyzed by the PBTI Lab, Mohali (Designated State Lab, Punjab). Analysis results of these soil samples are annexed as **Annexure-C**.

There is a significant observed variation in the analysis results given by the PBTI Mohali (State Laboratory) and by the Department of Agriculture, Himachal Pradesh. This issue was discussed in-depth by the committee but no definite inference could be drawn out of the same. Members of the CPCB & PPCB submitted that there is no effluent from the industry which could have led to this kind of effect on the soil in the vicinity of the industry.

In view of the above submissions it is humbly prayed that report as above may please be taken on record and suitable orders be passed in the matter please.

(Raghav Sharma, IAS)
Deputy Commissioner
Una, HP

(Preeti Yadav, IAS)
Deputy Commissioner
DC Rupnagar, PB

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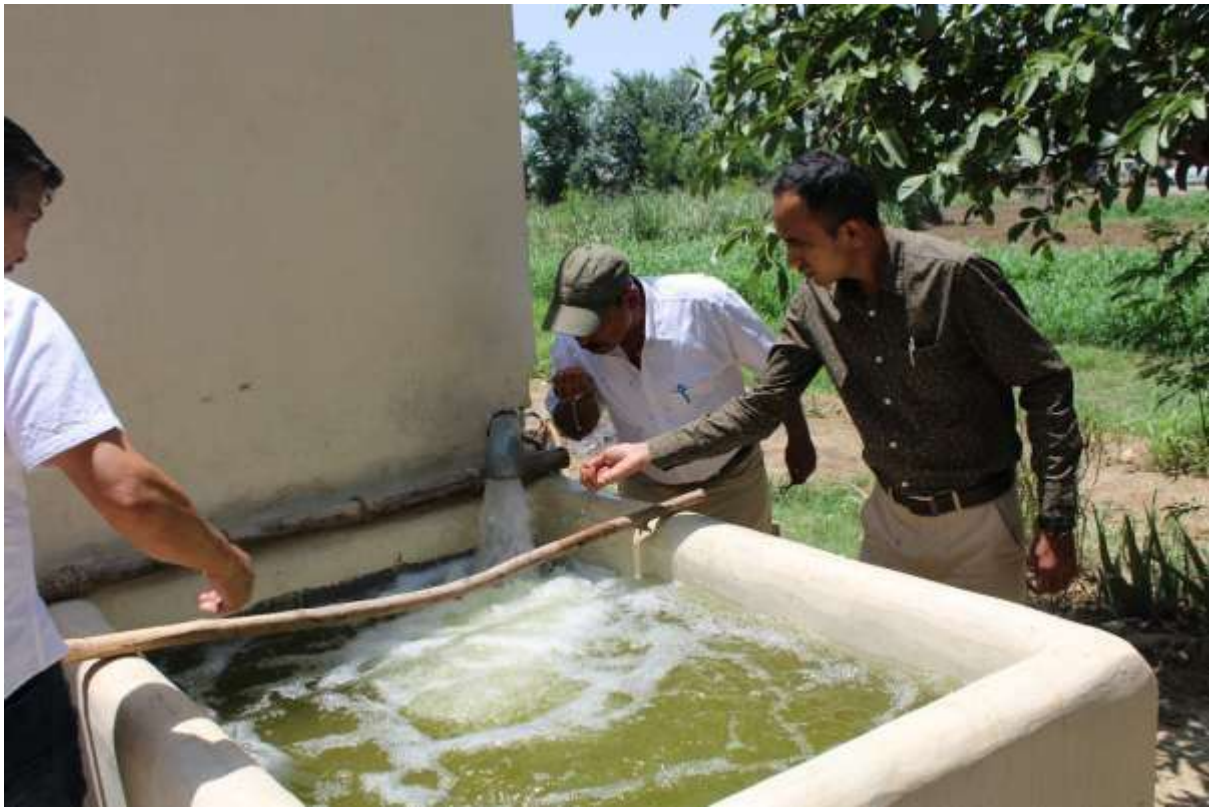
(J P Meena)
CPCB, RD
Chandigarh

(Rakesh Rana)
CGWA, Chandigarh

(AK Sharma, EE)
PPCB, Rupnagar

Annexure- A



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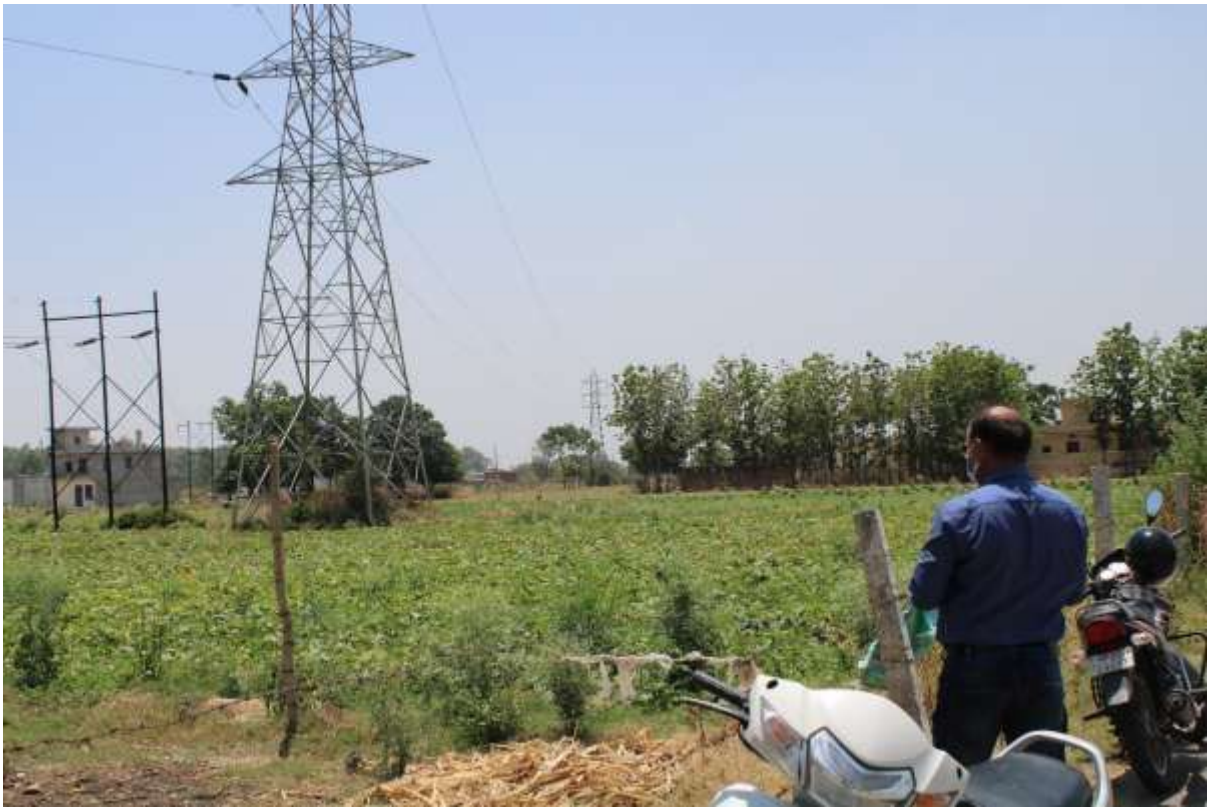

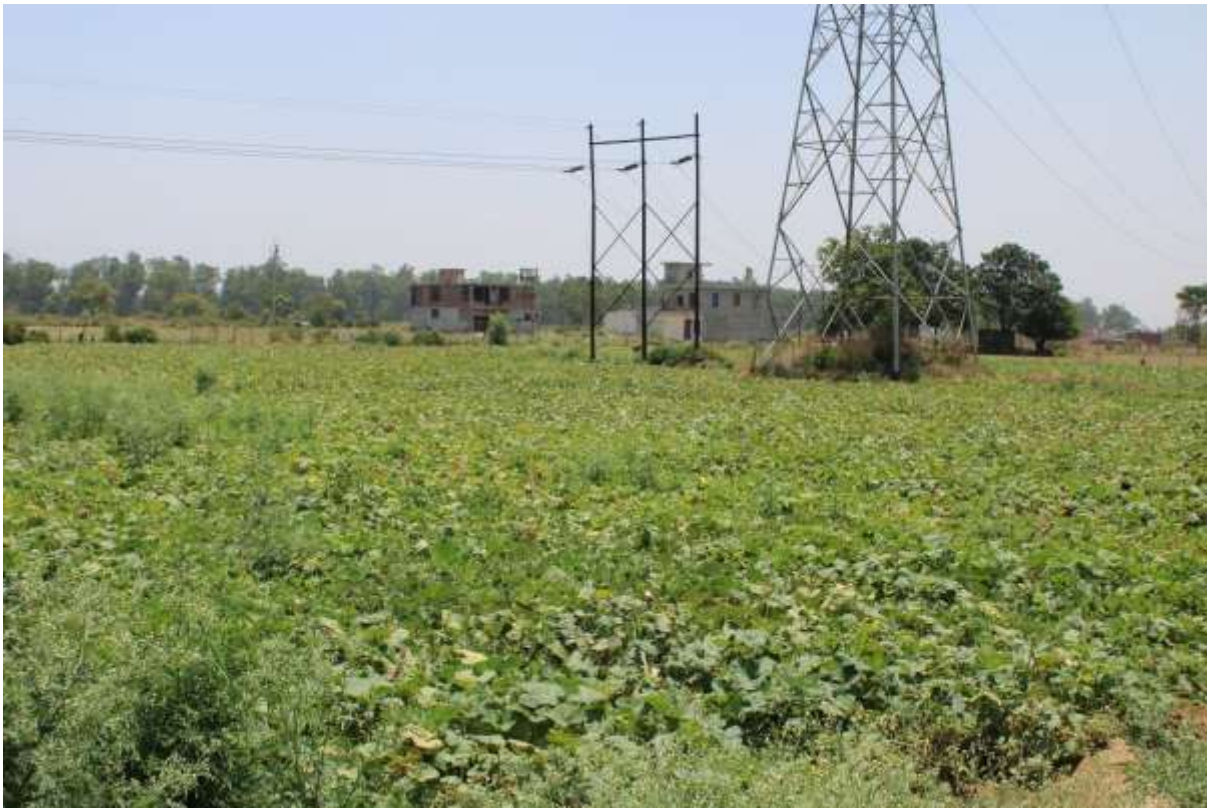

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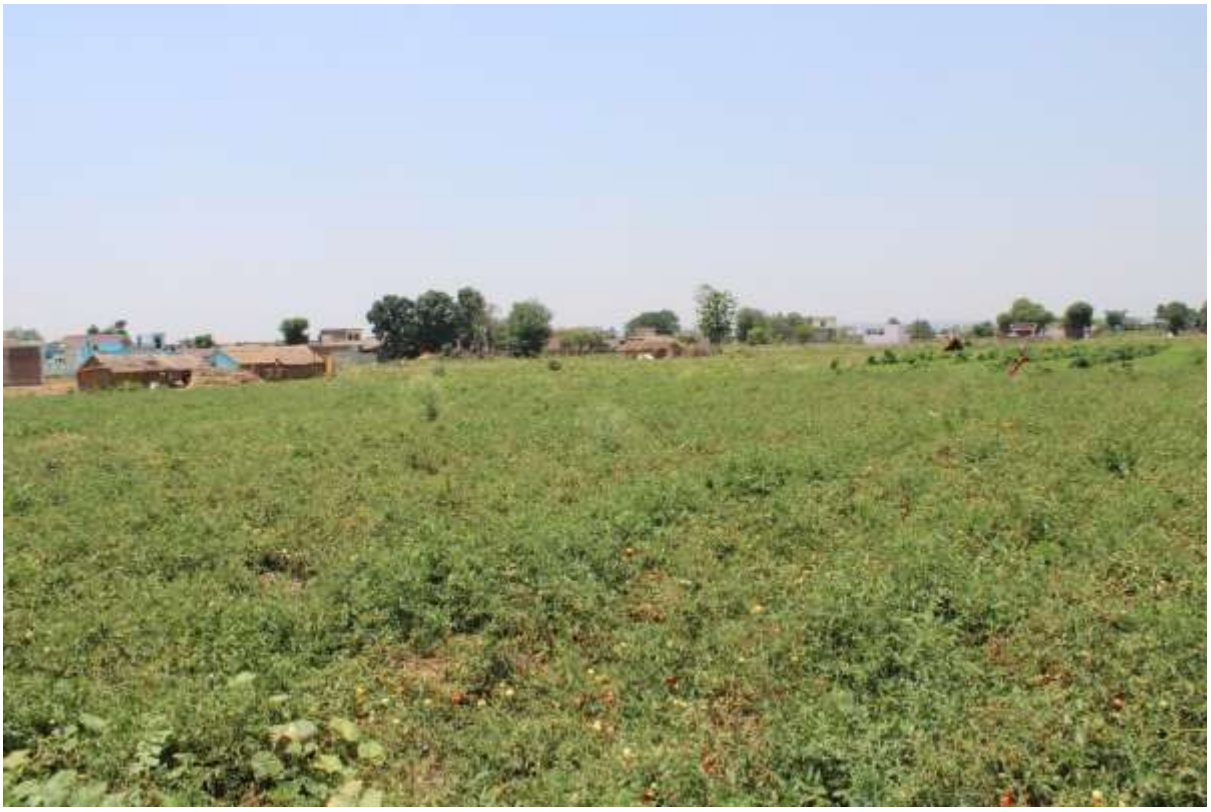

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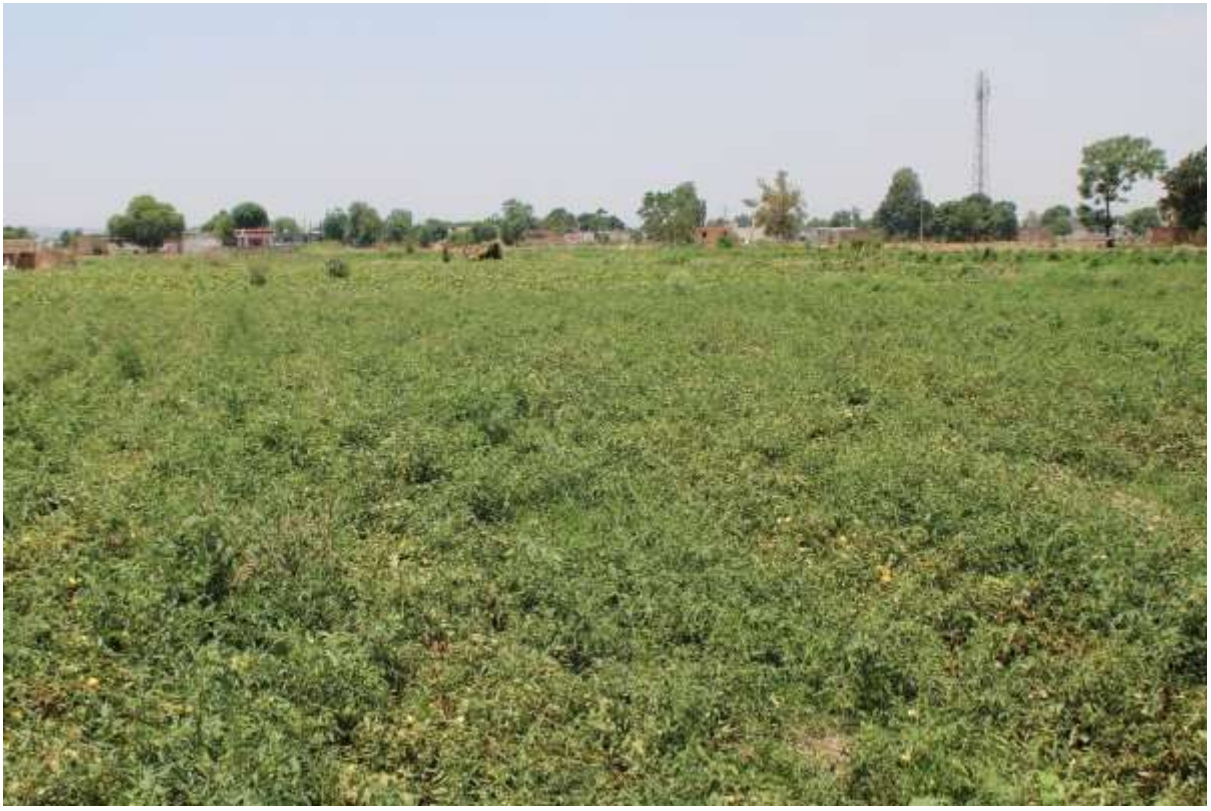

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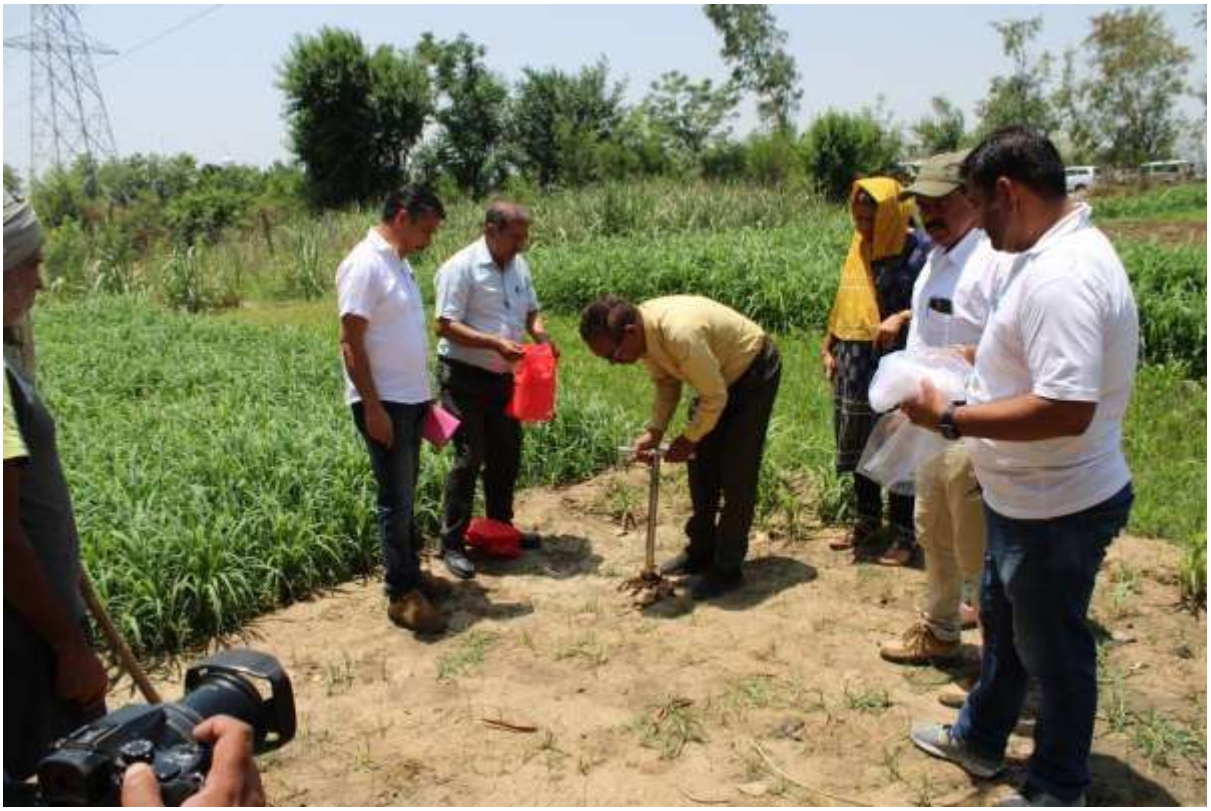

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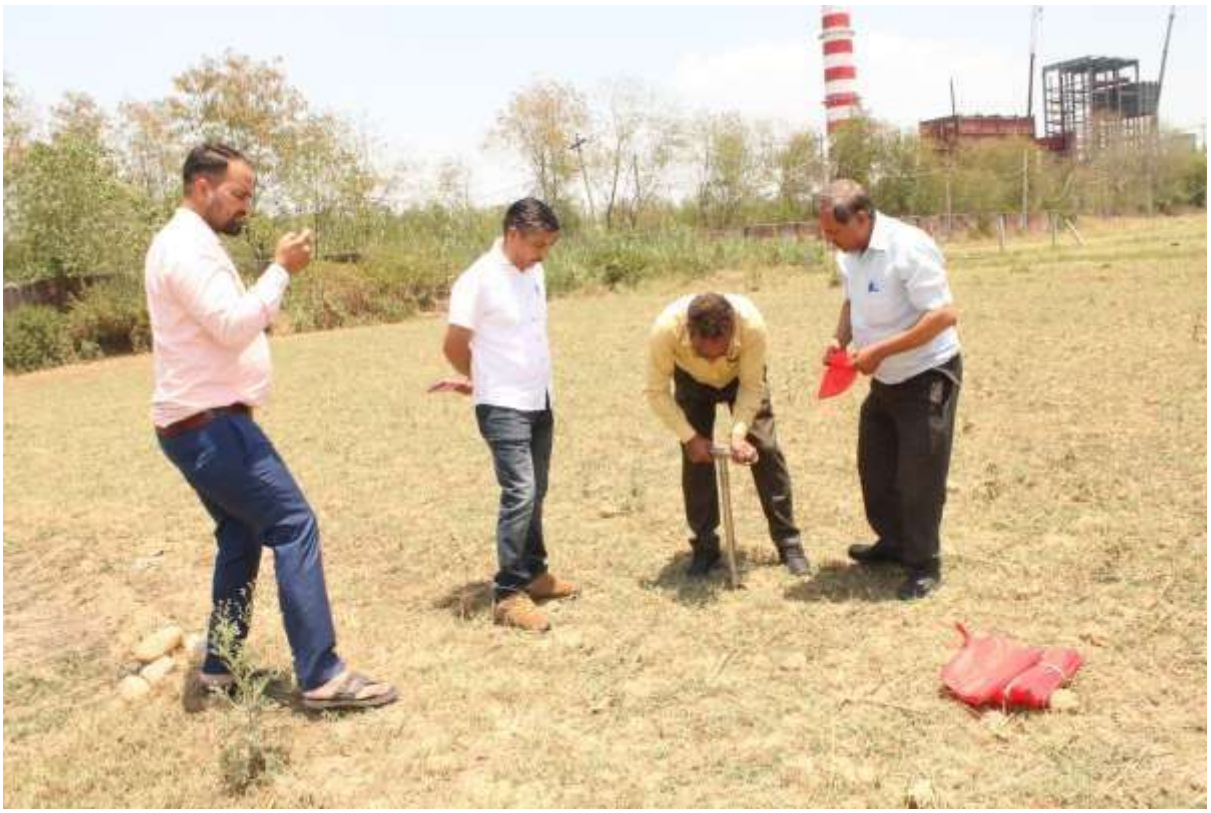

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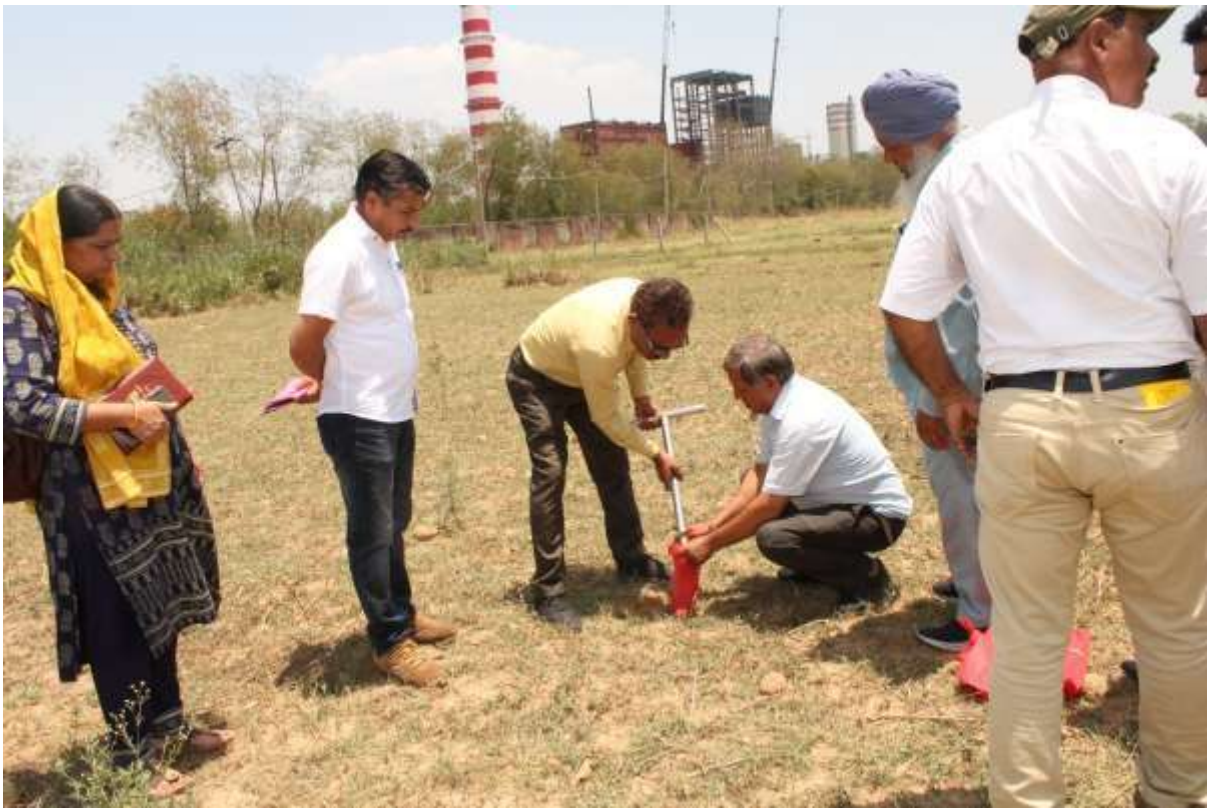

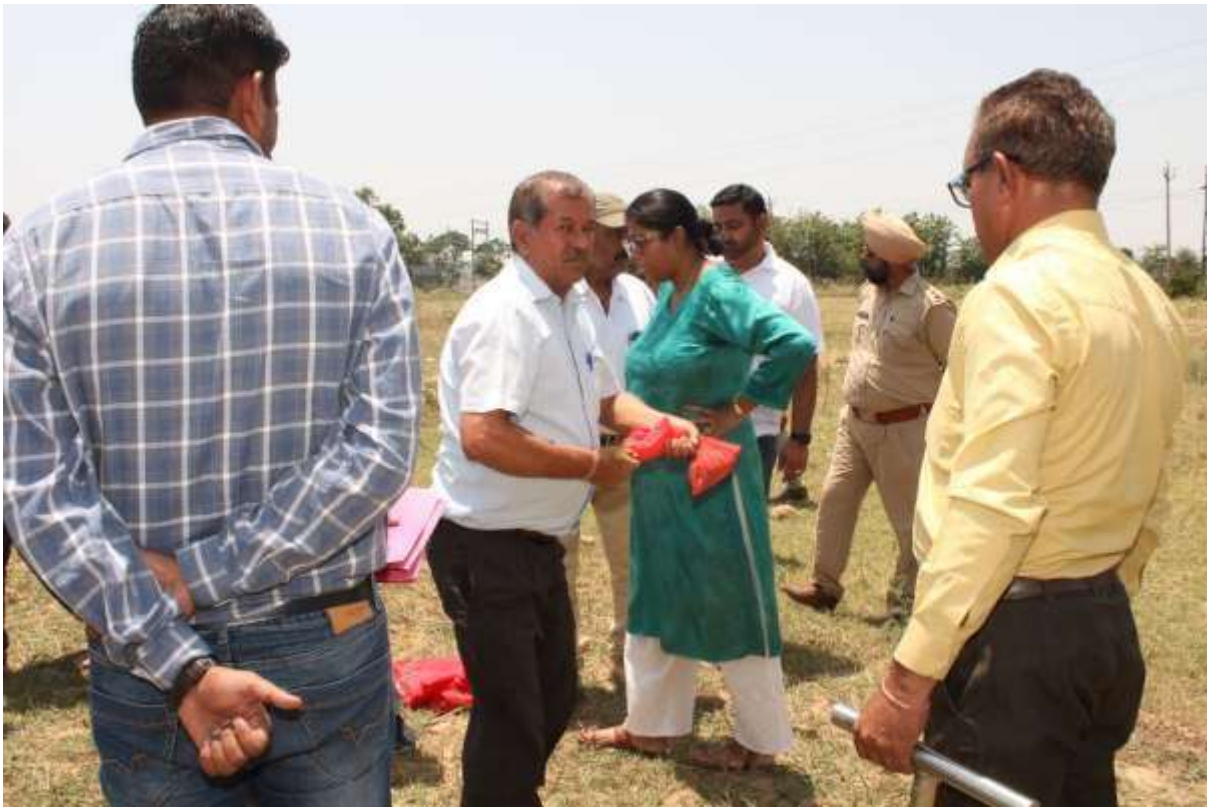

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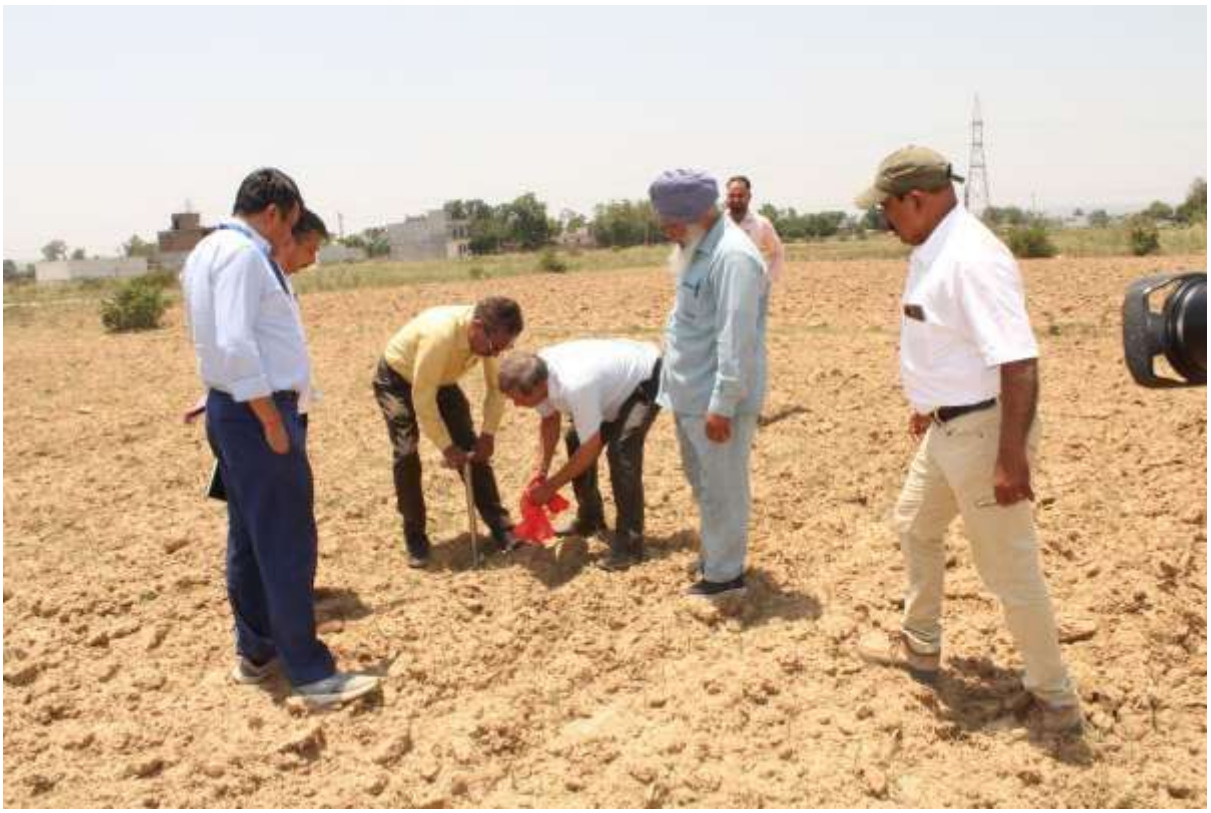

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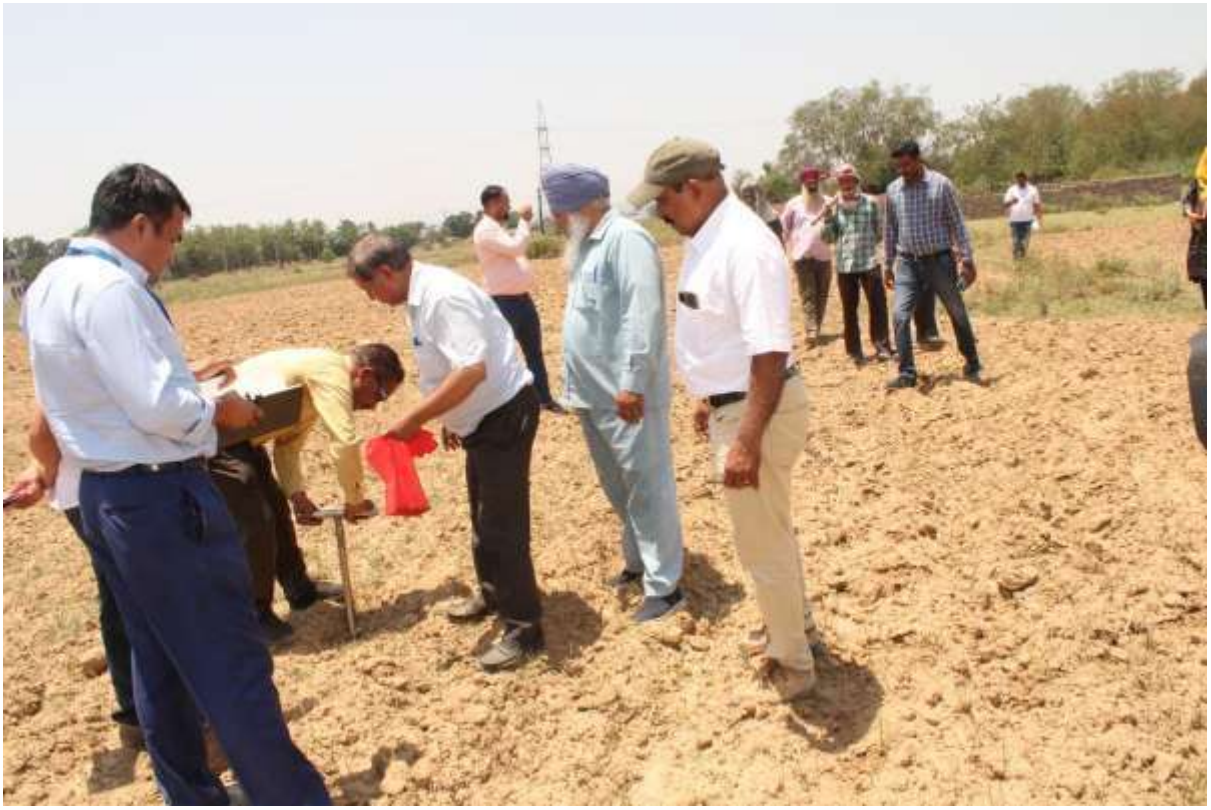

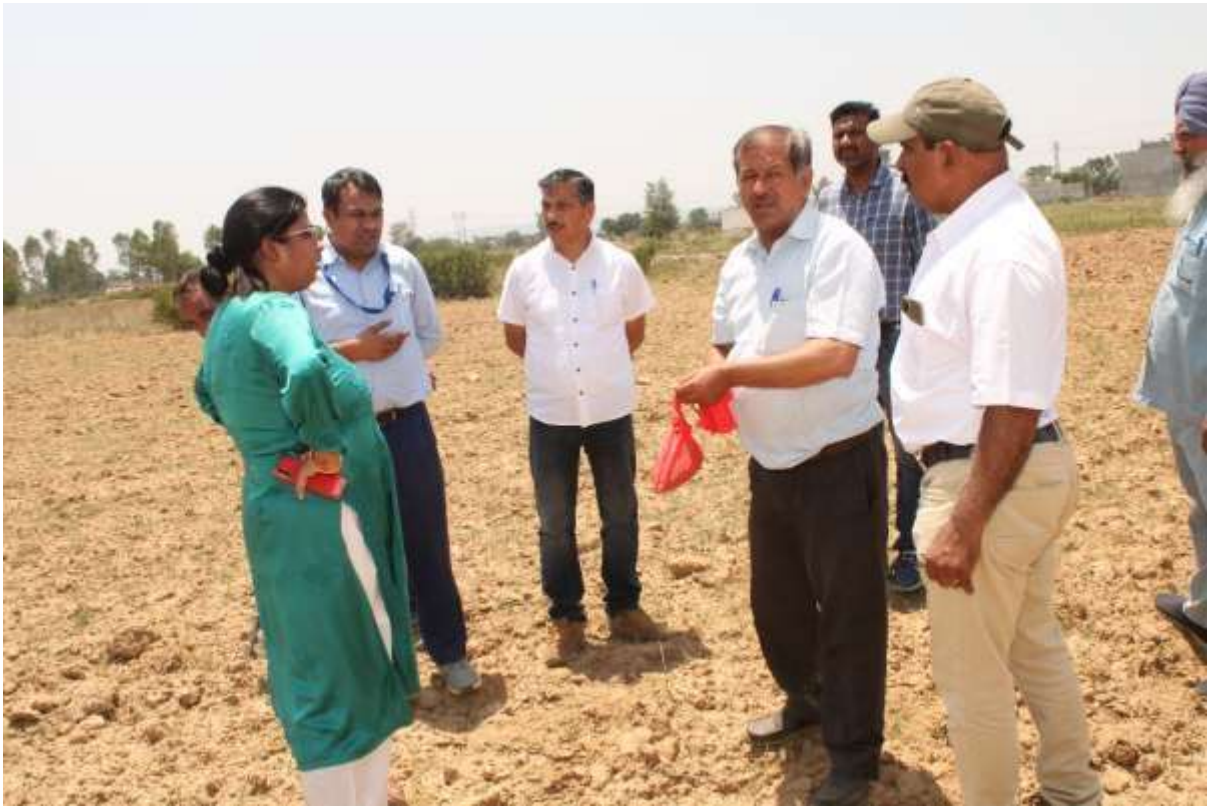

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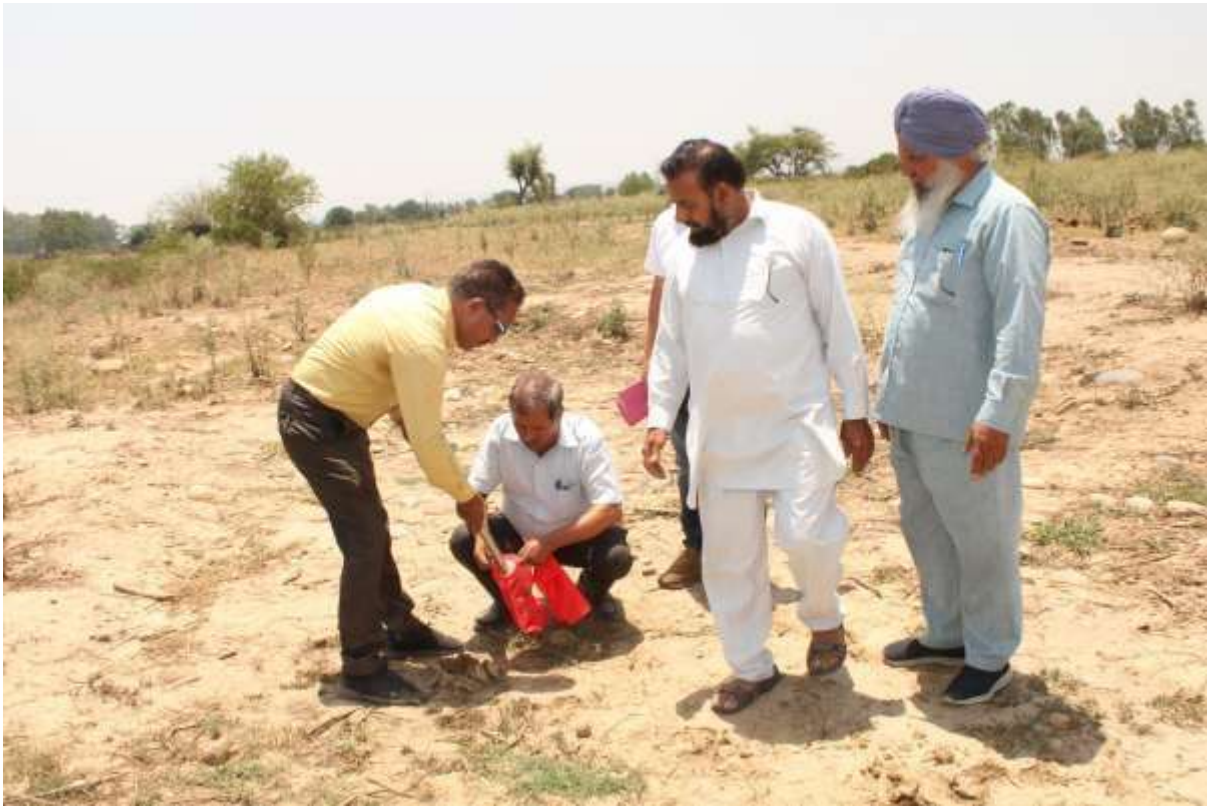

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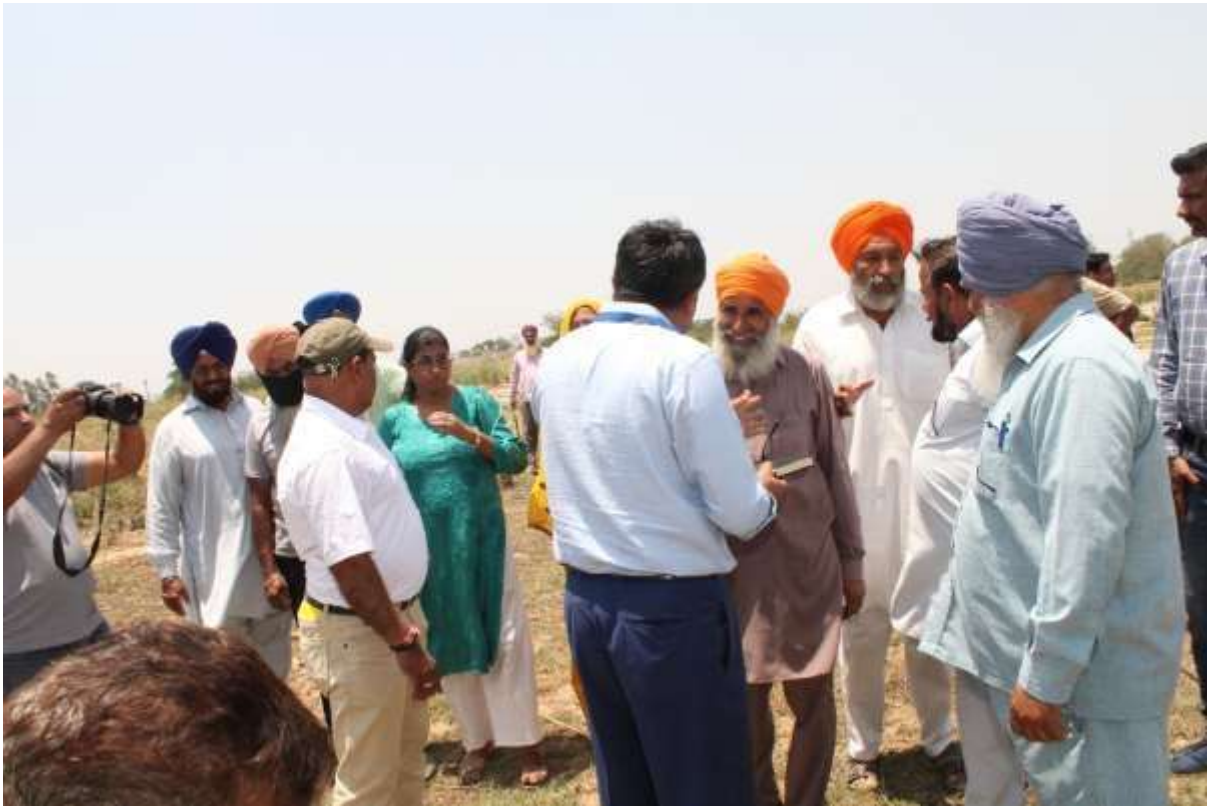

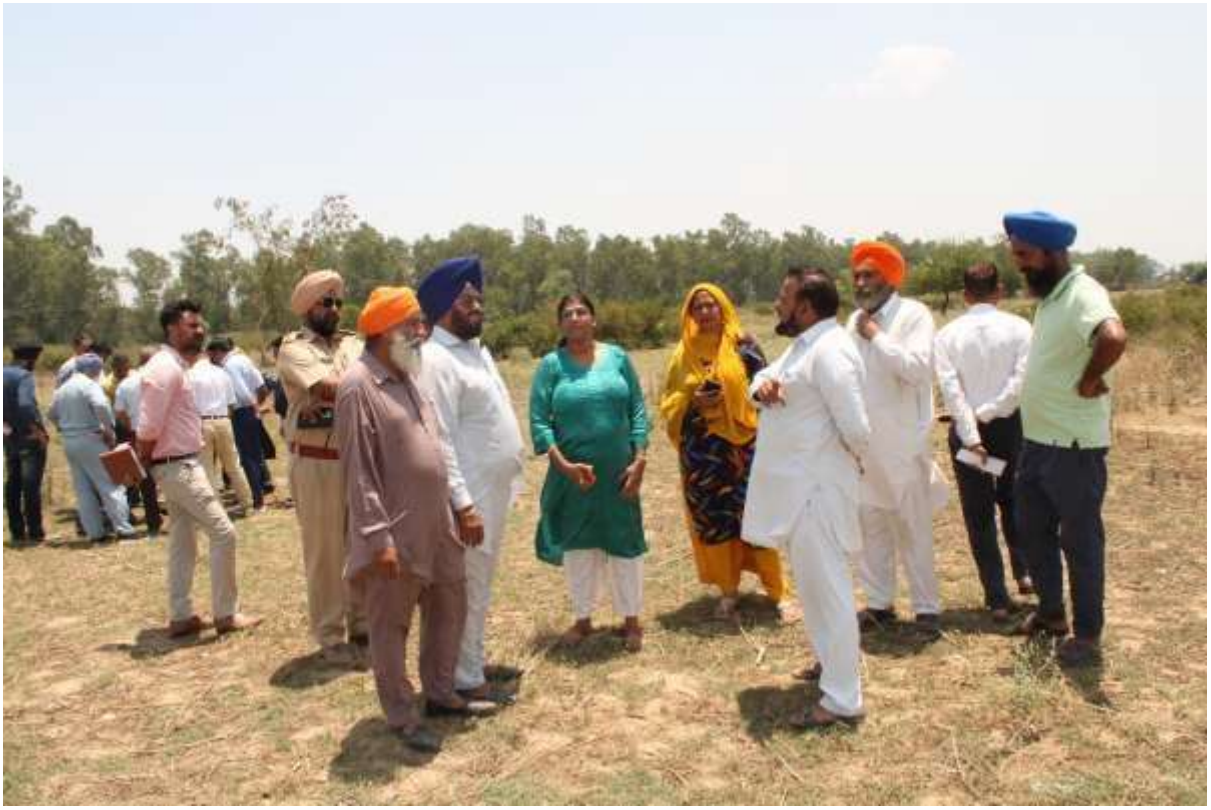

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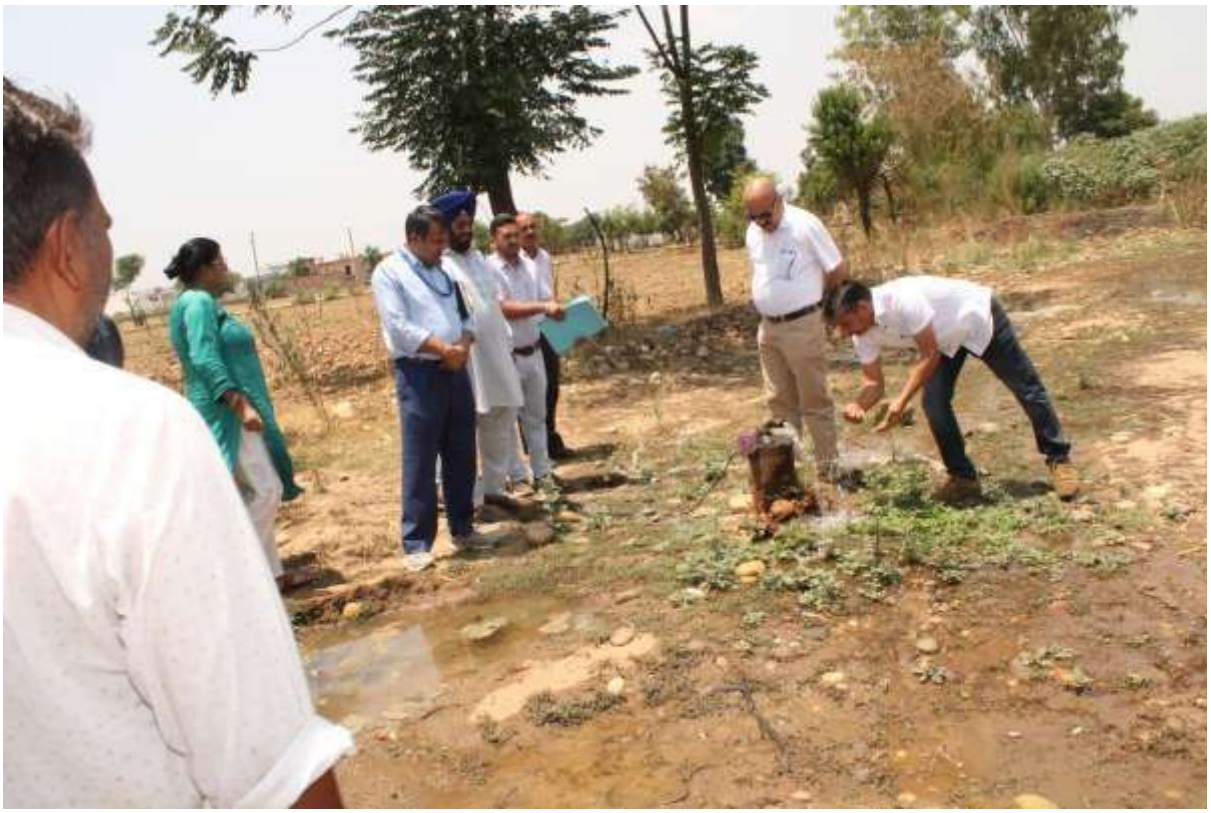

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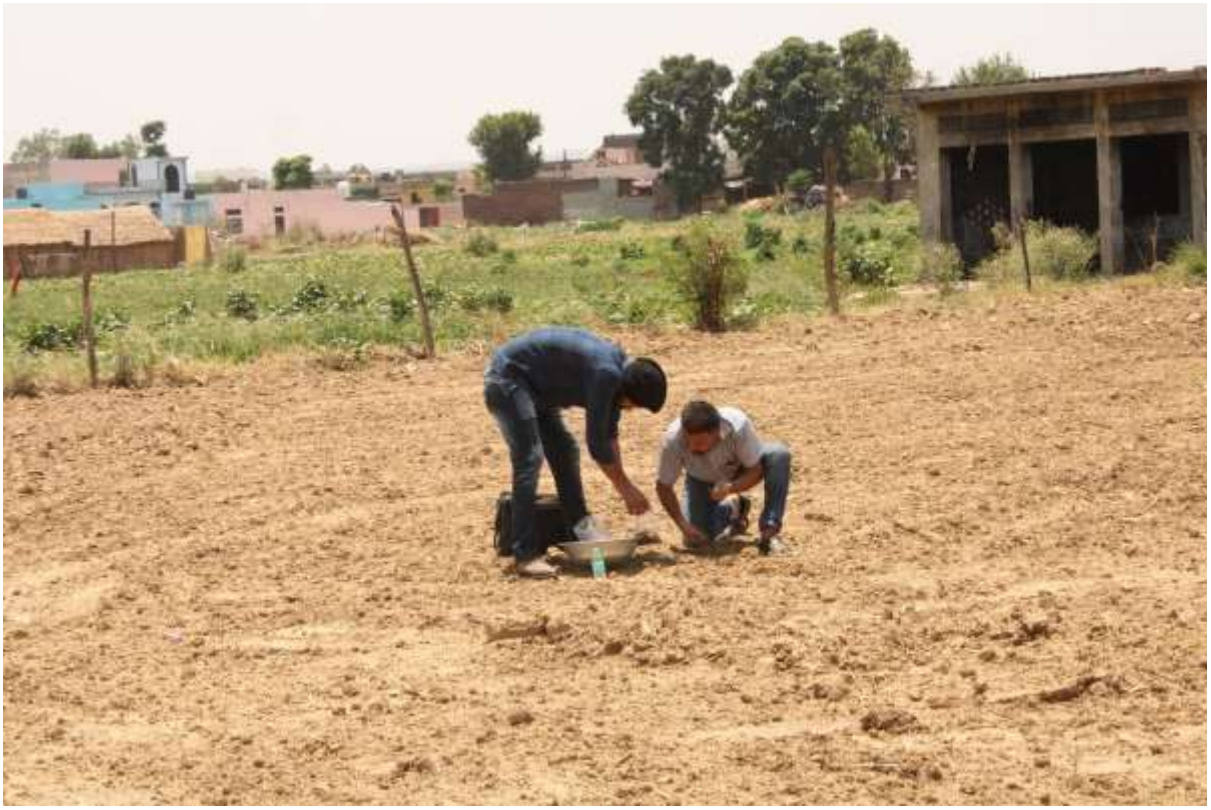

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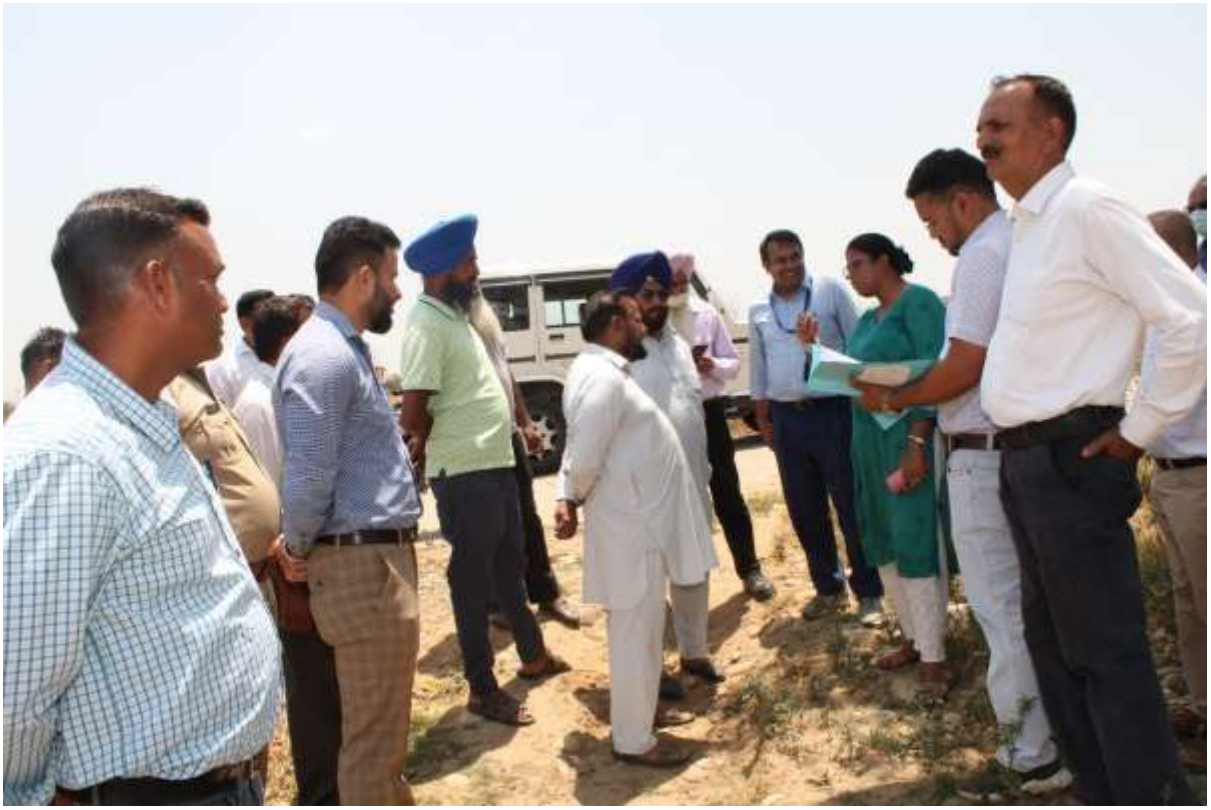

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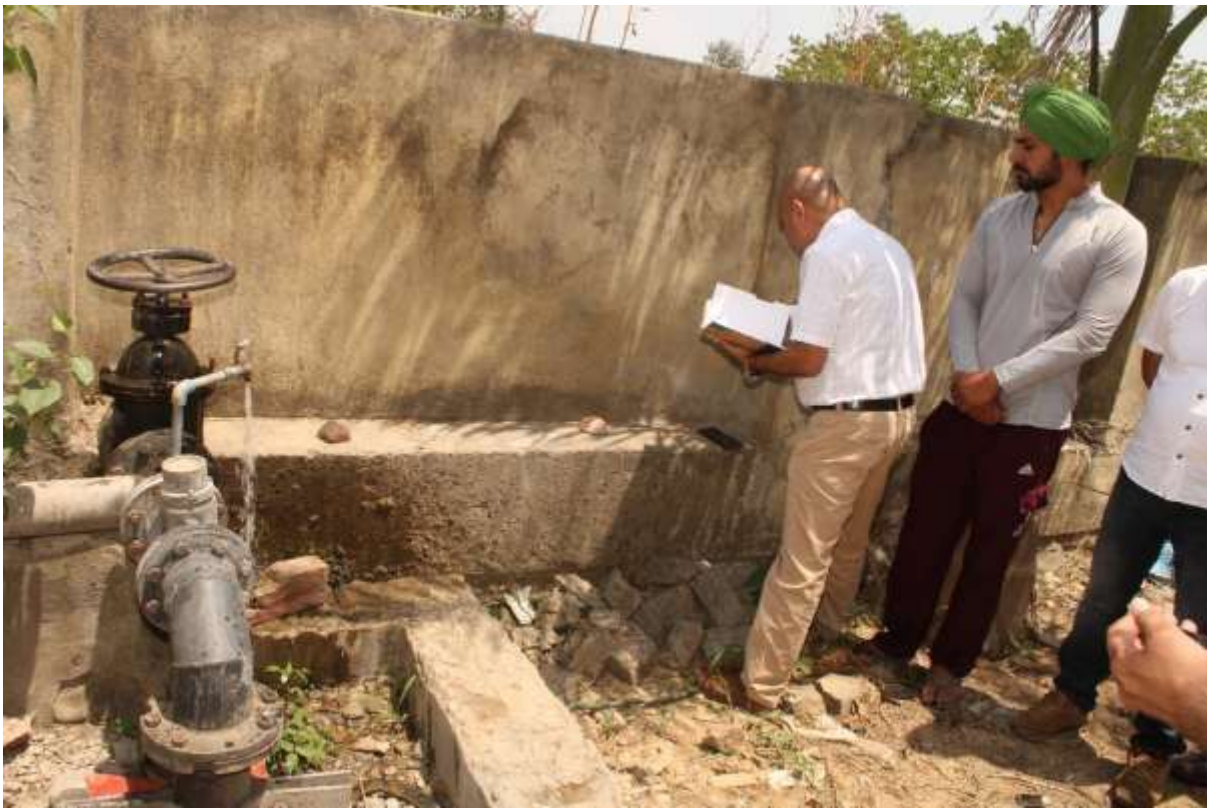

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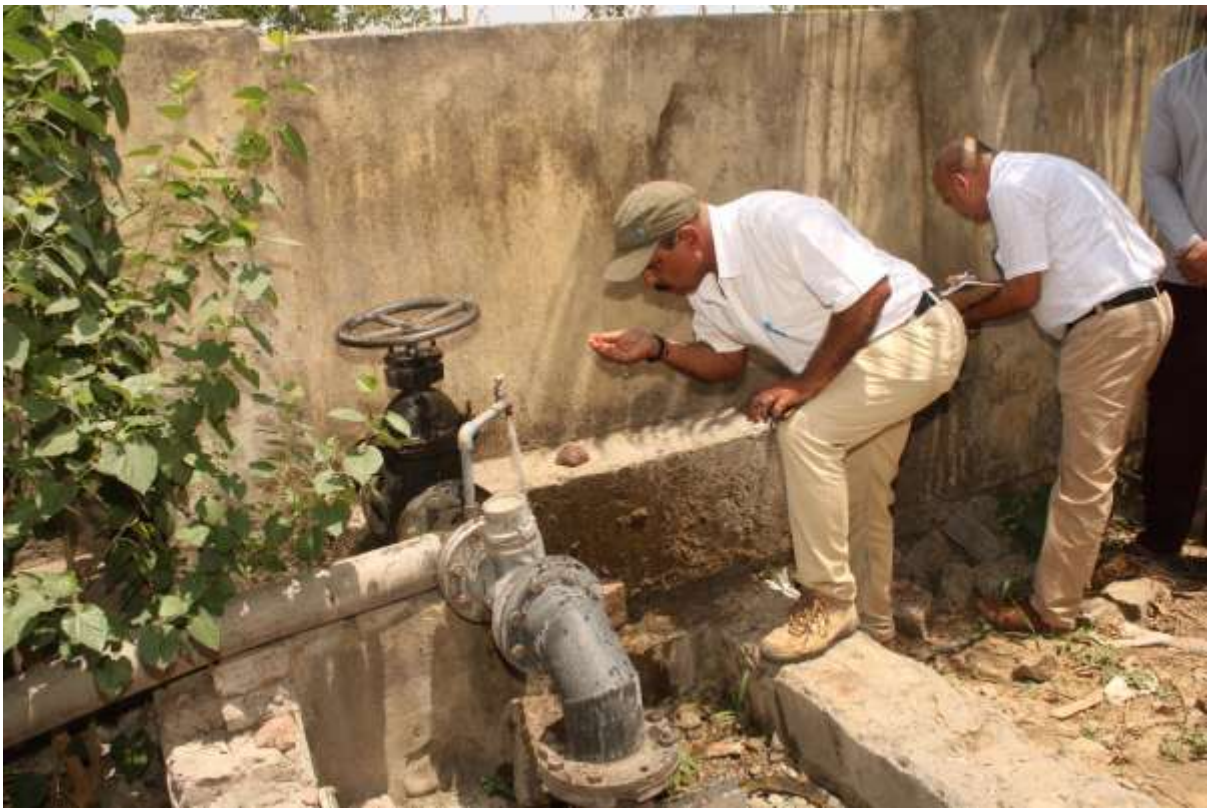

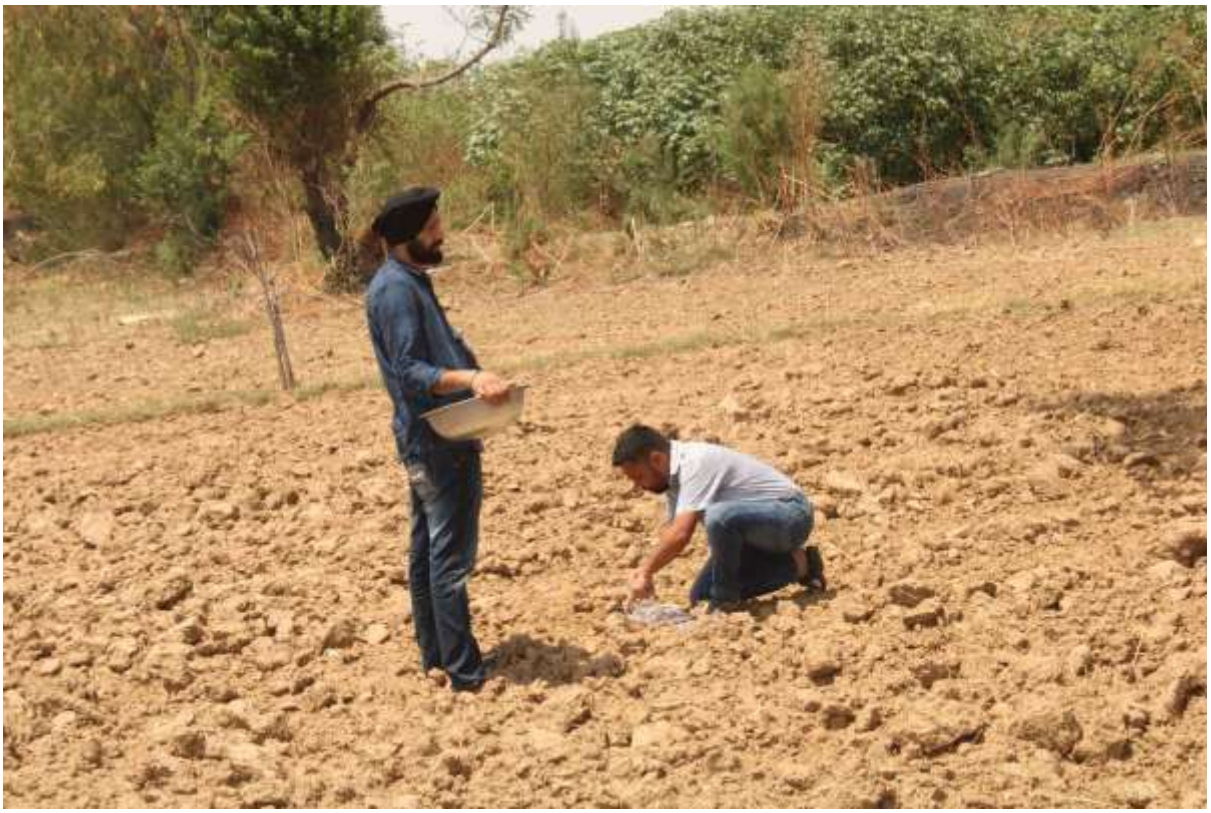

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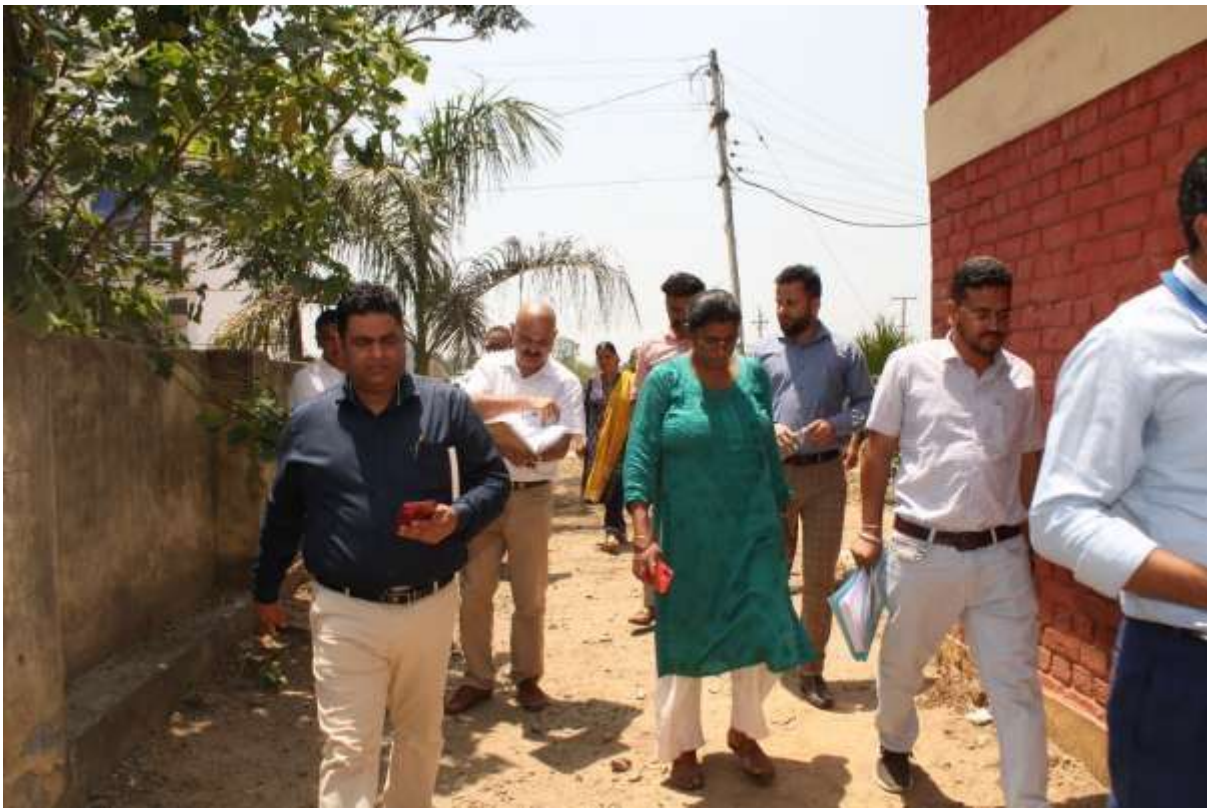

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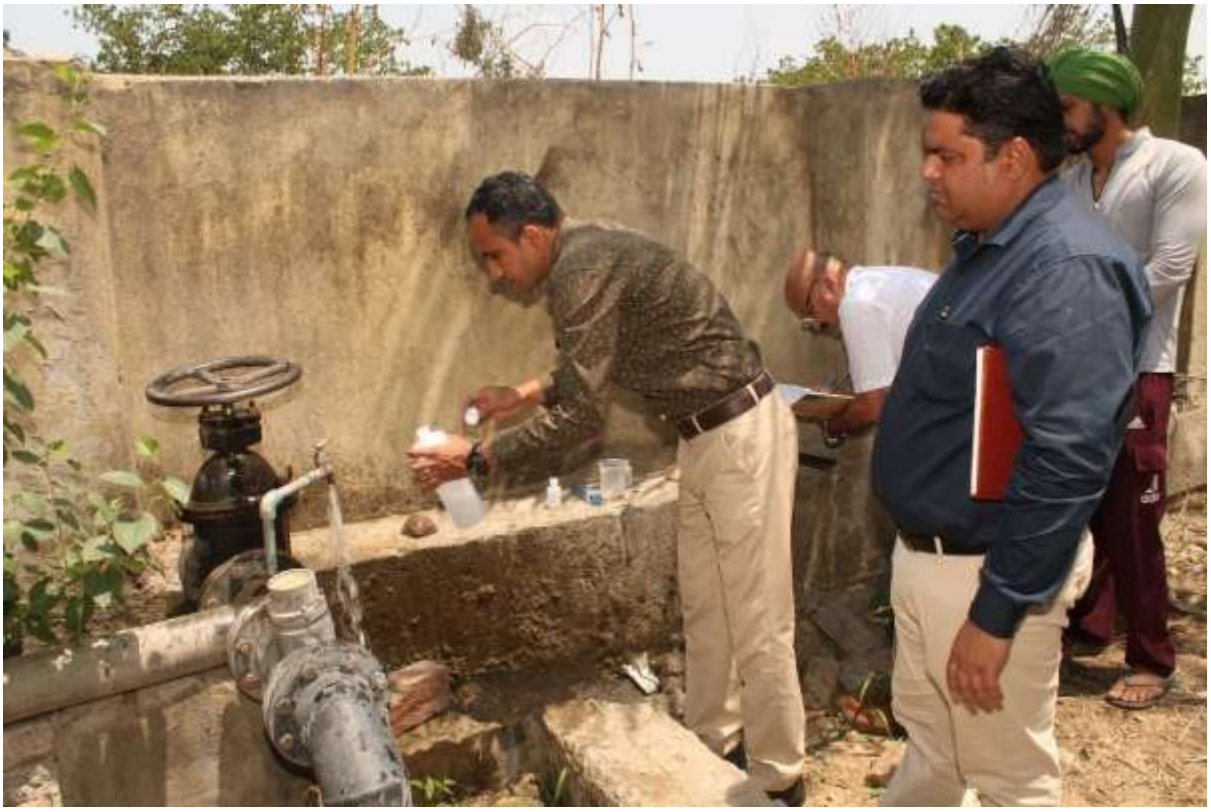

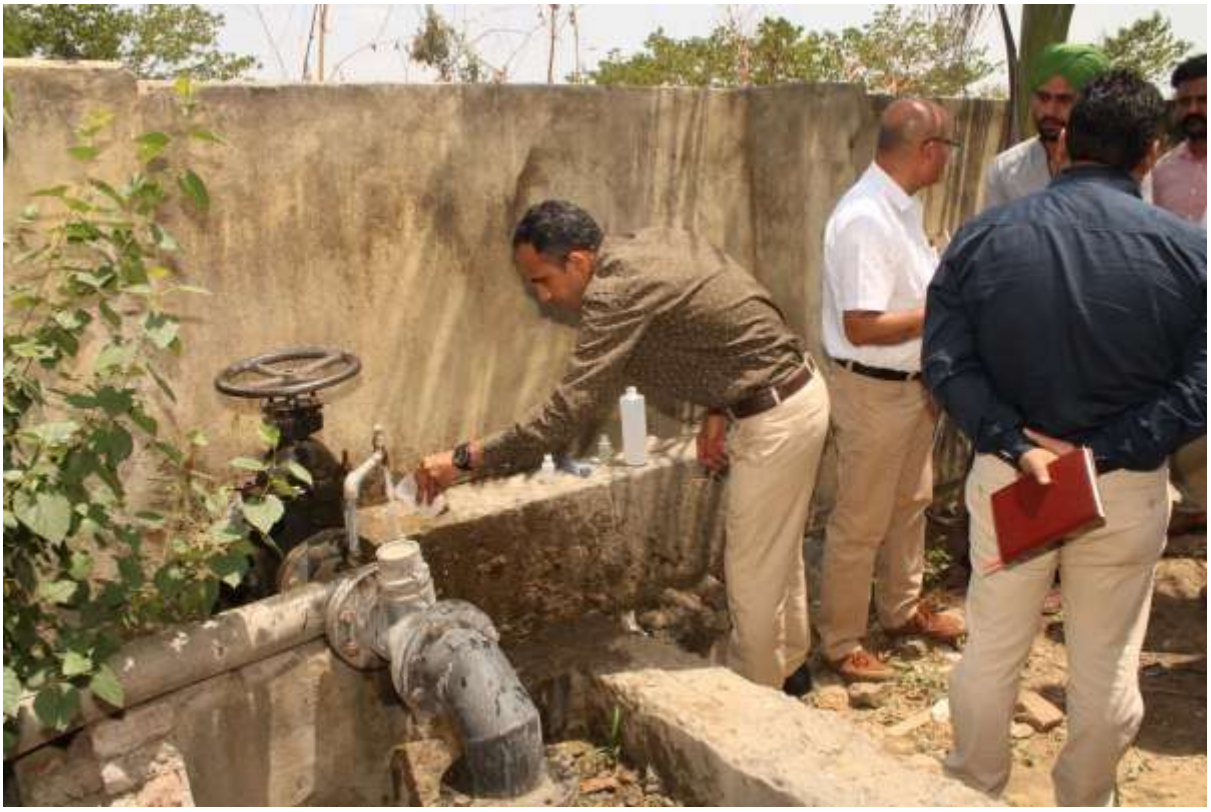

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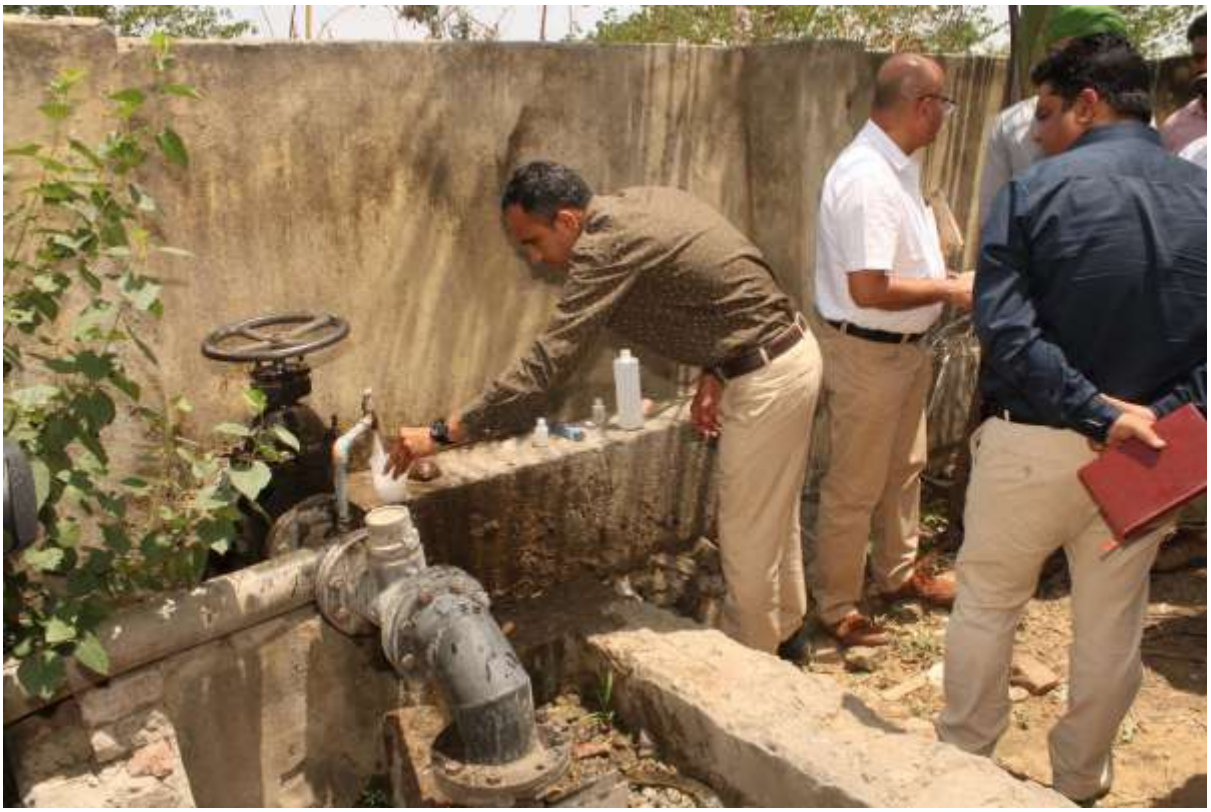

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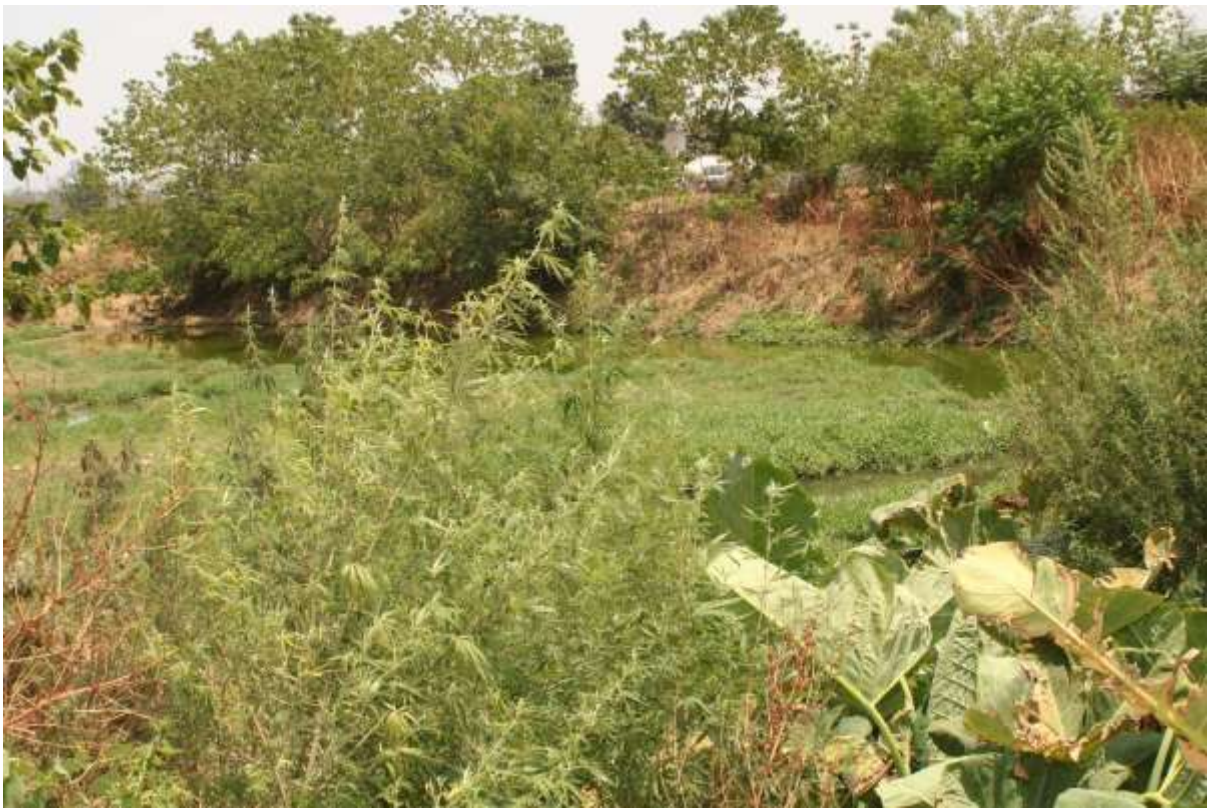

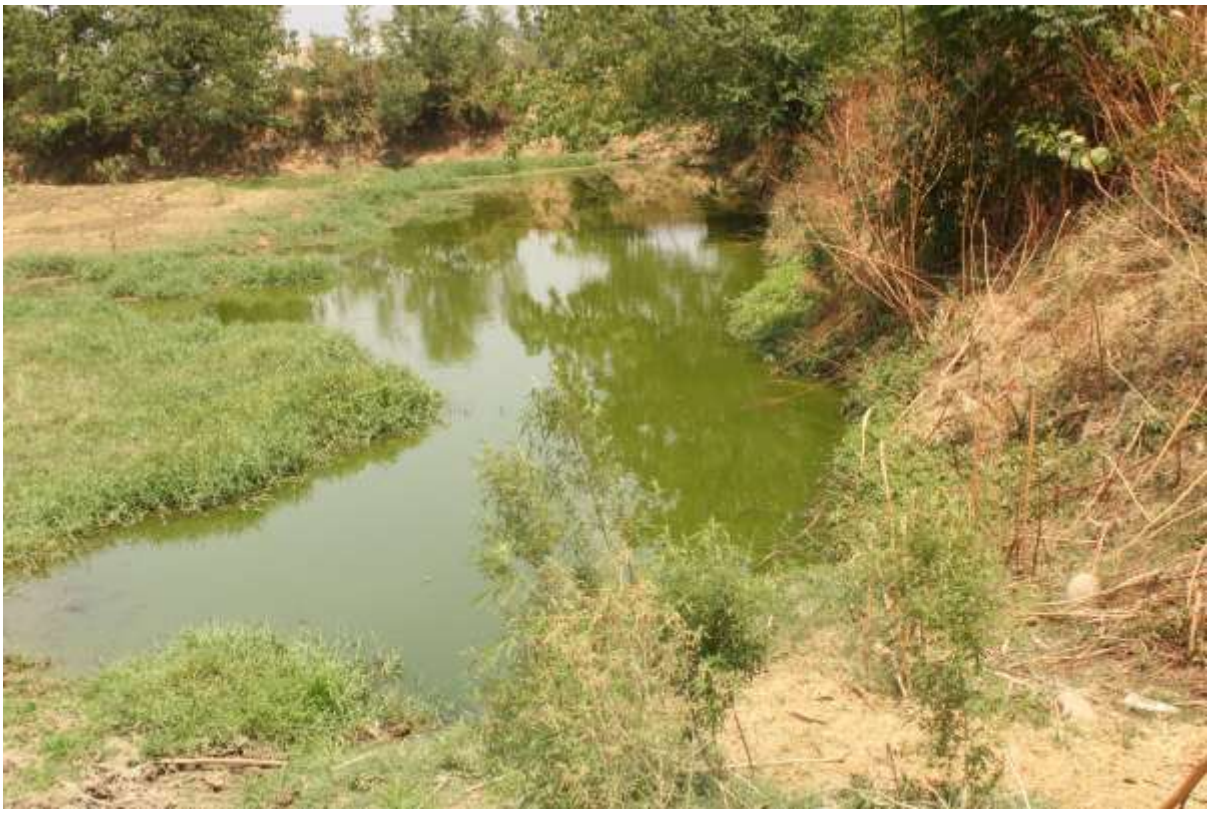

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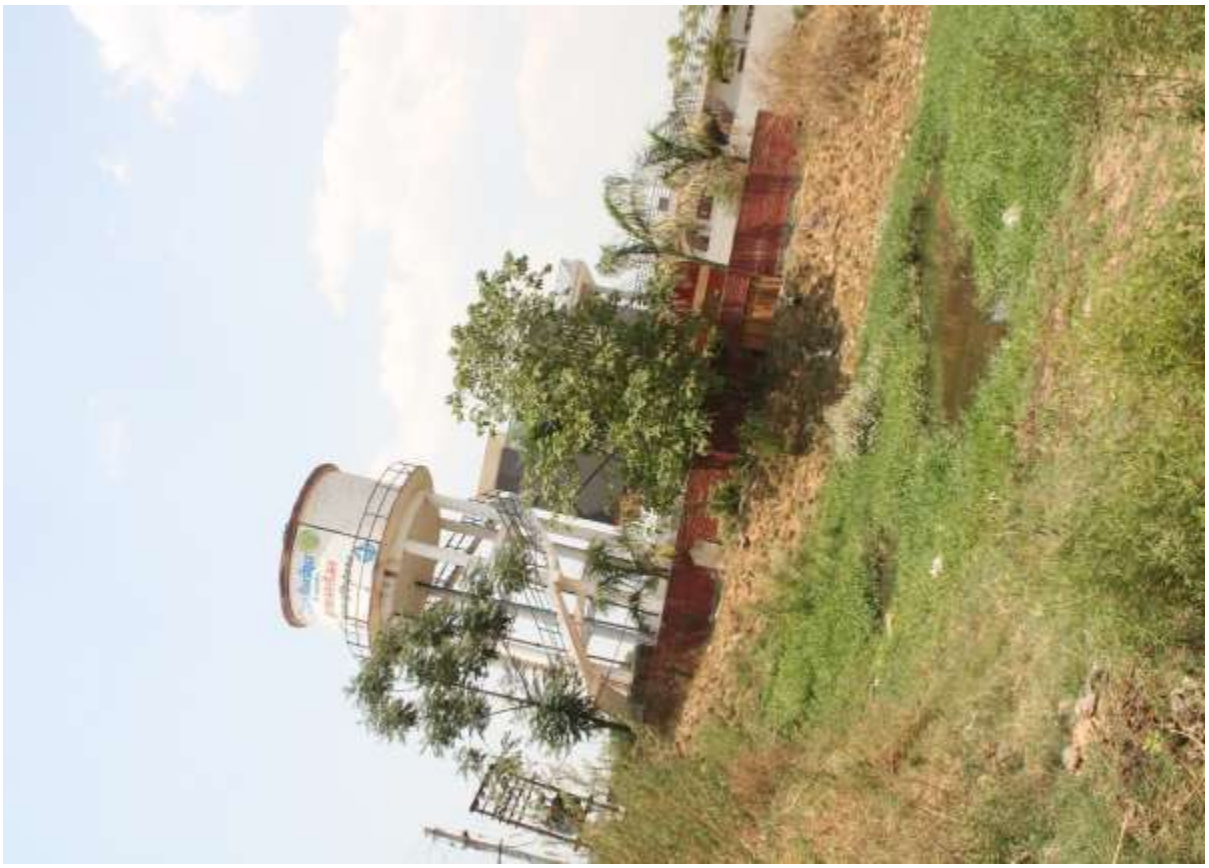

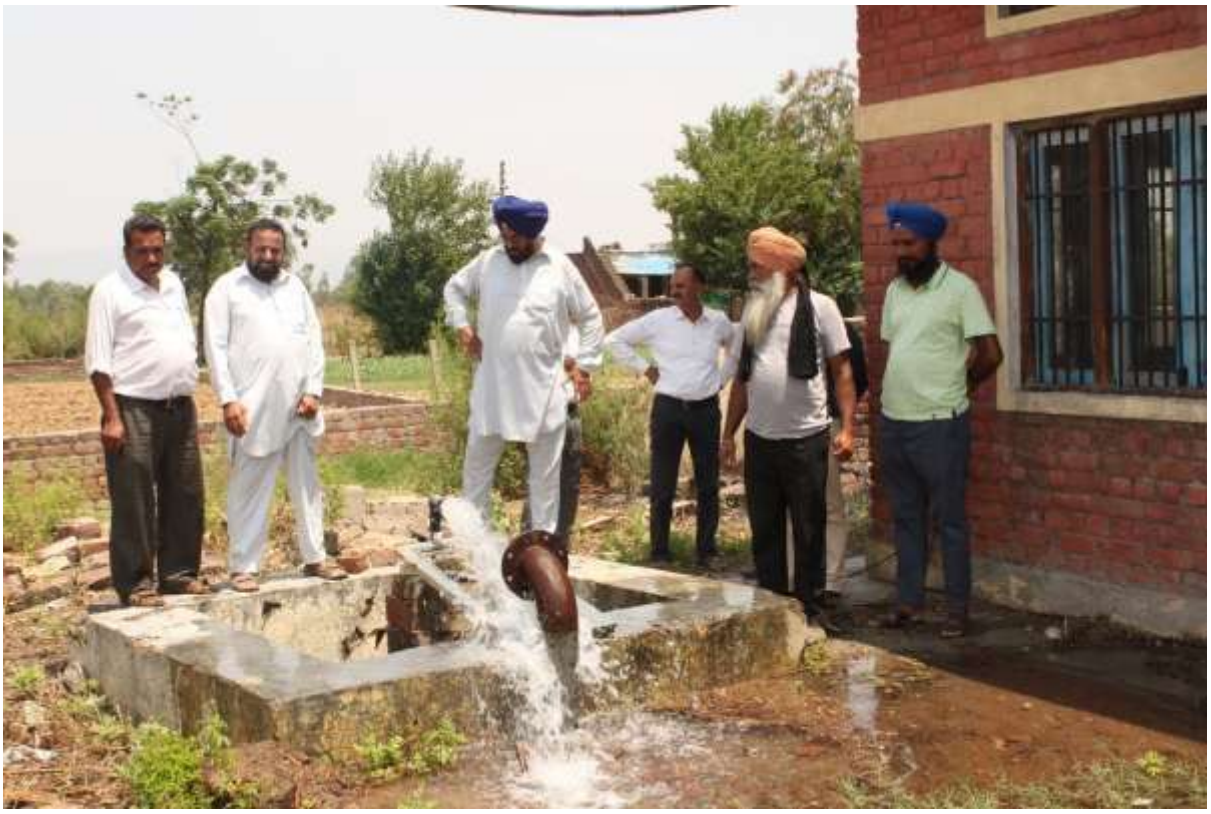

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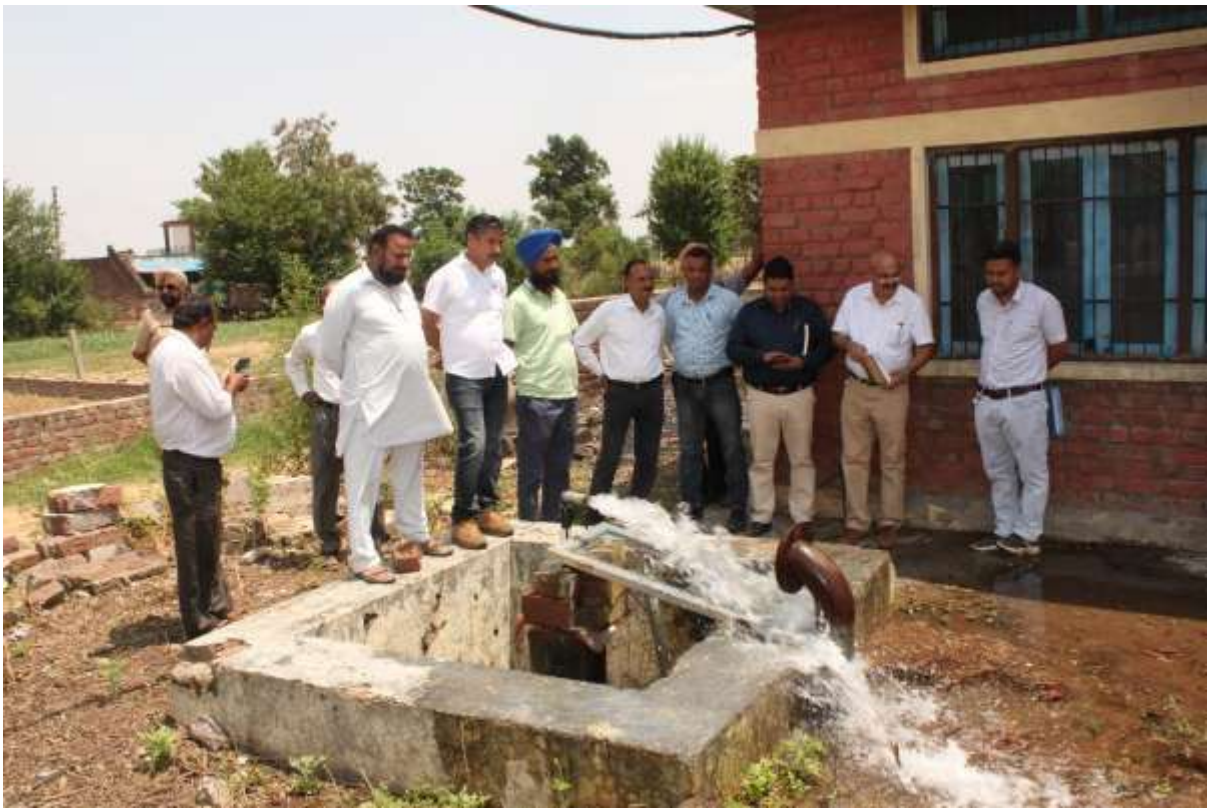

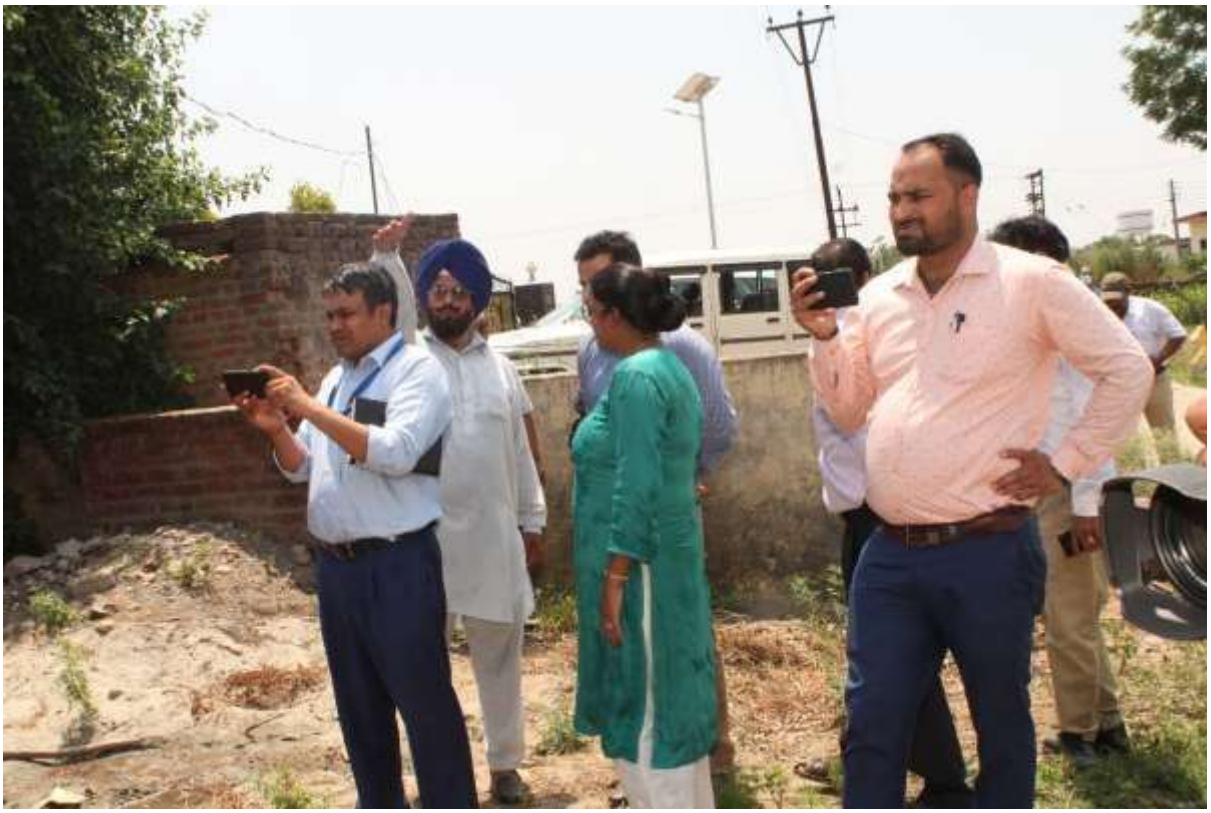

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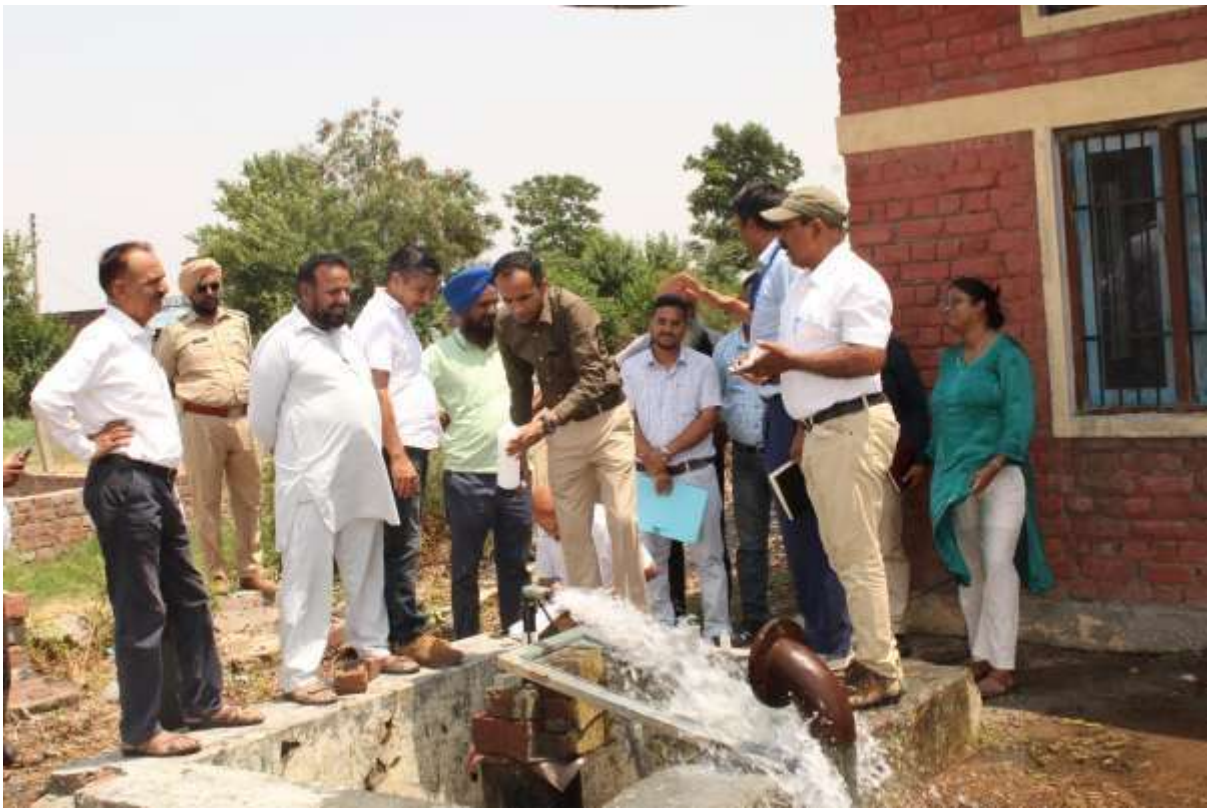

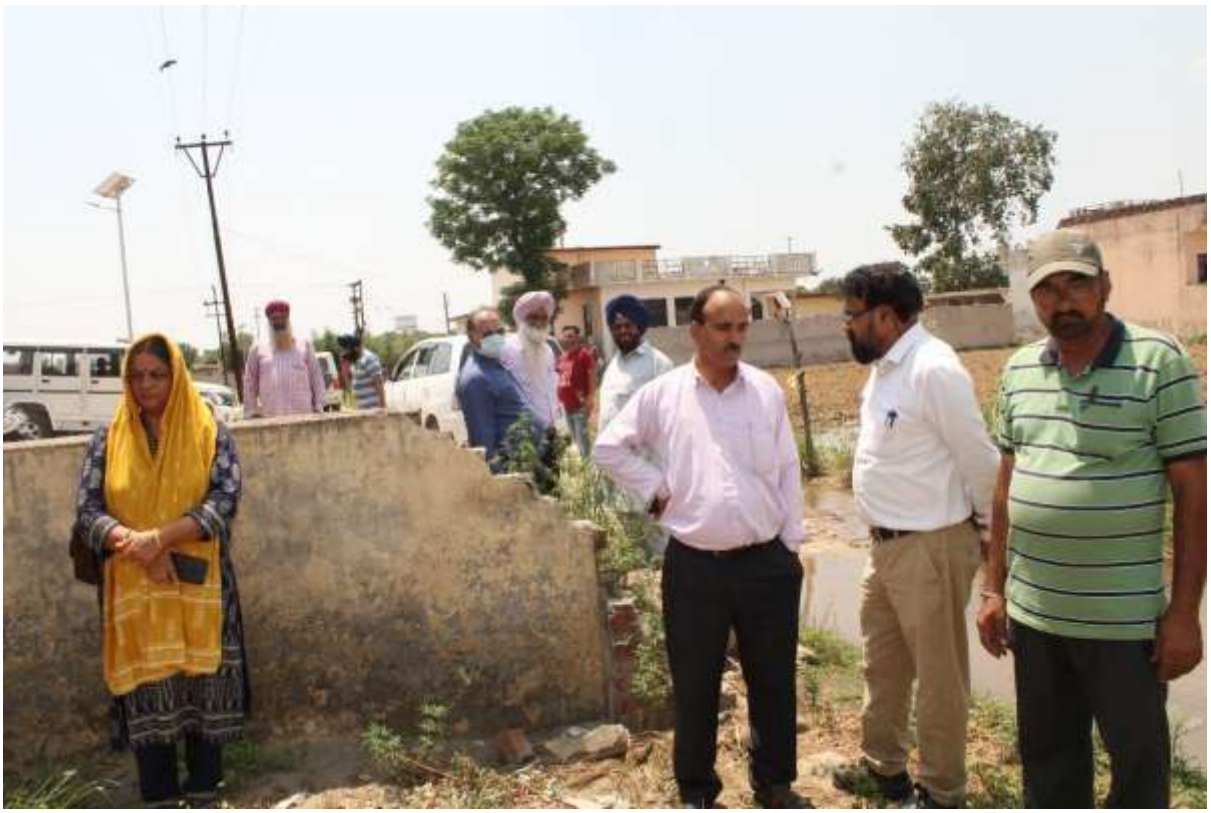

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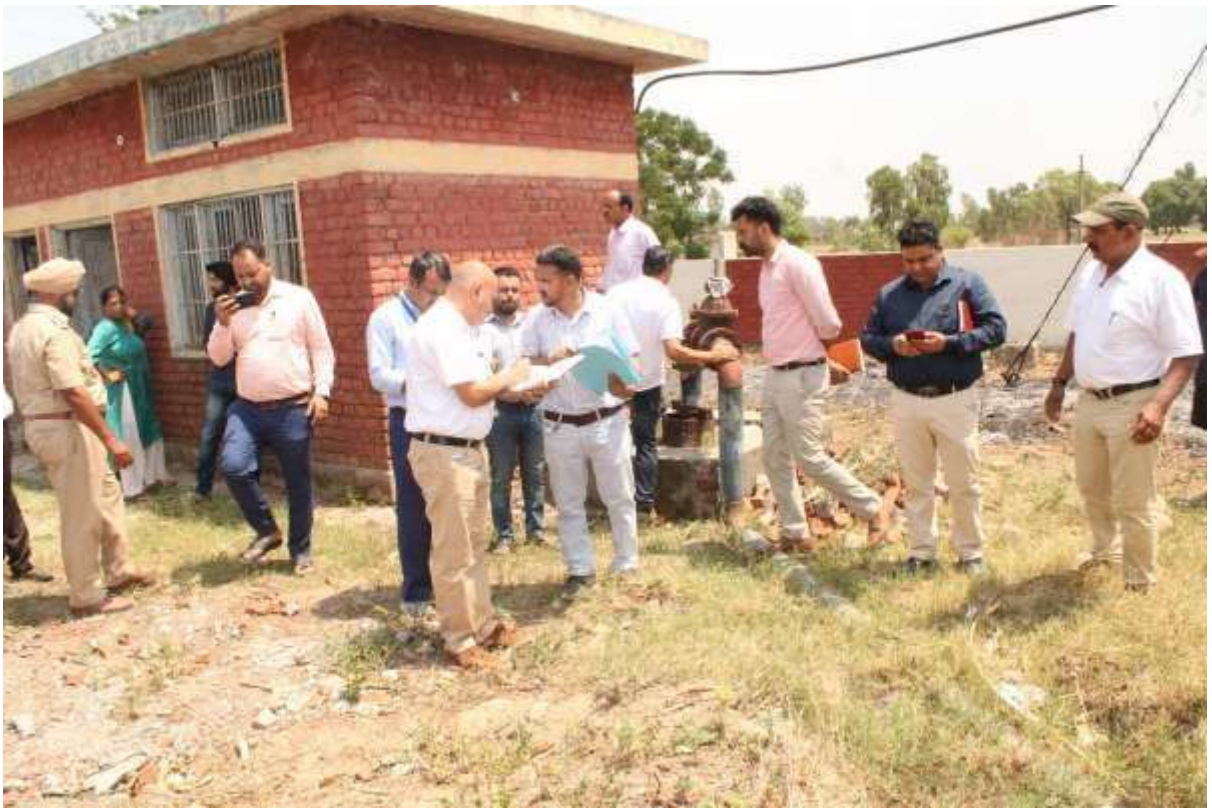

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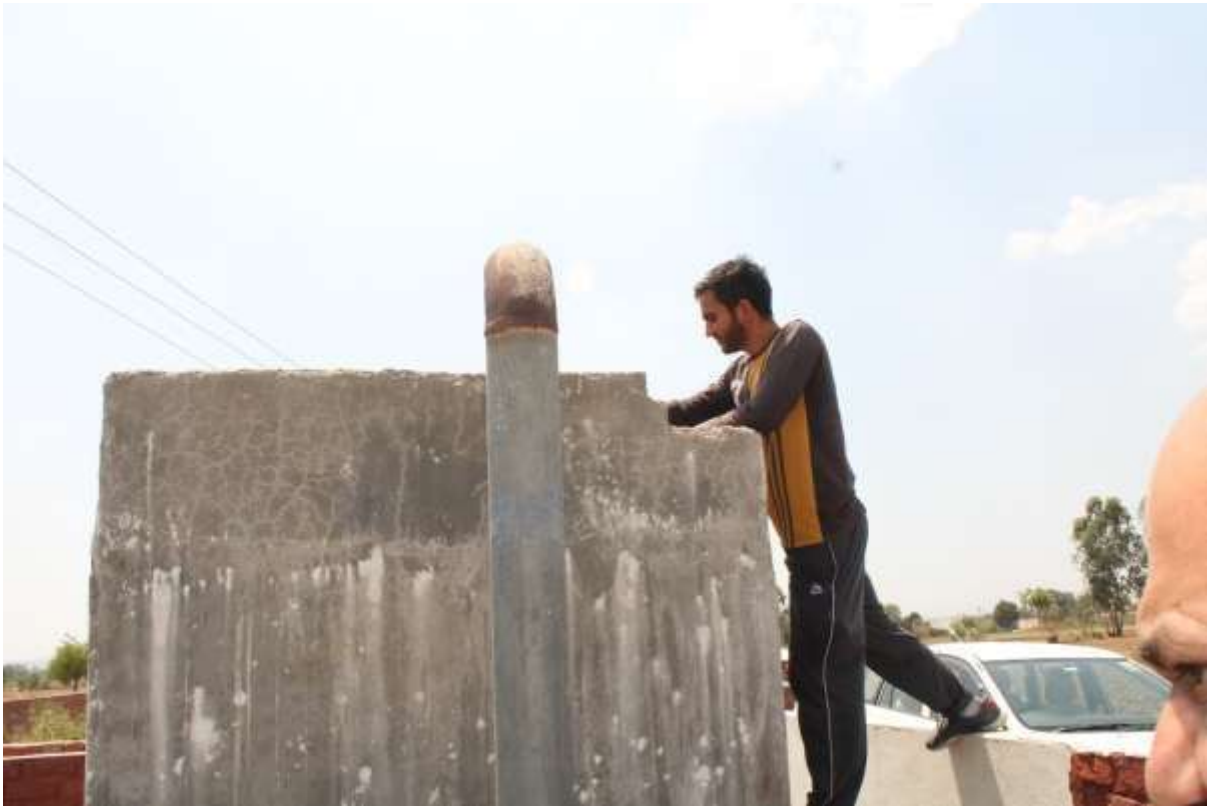

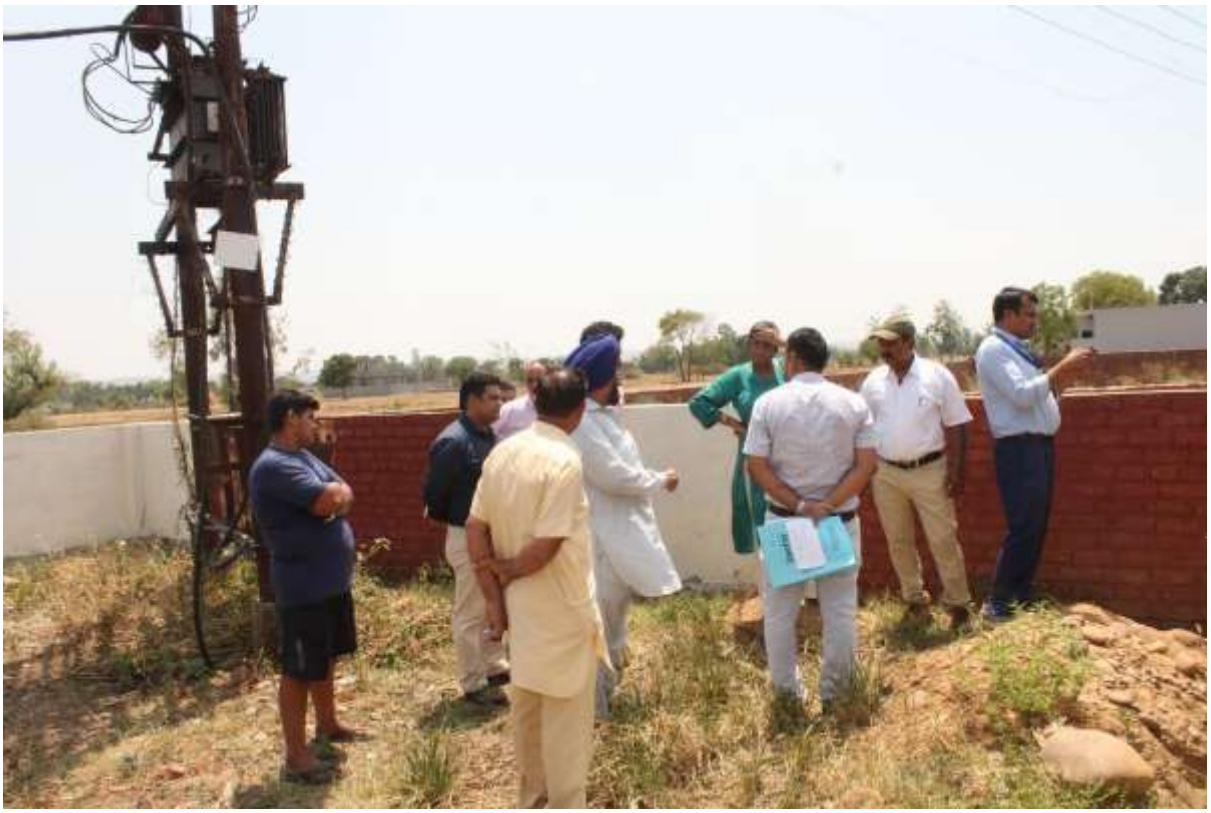

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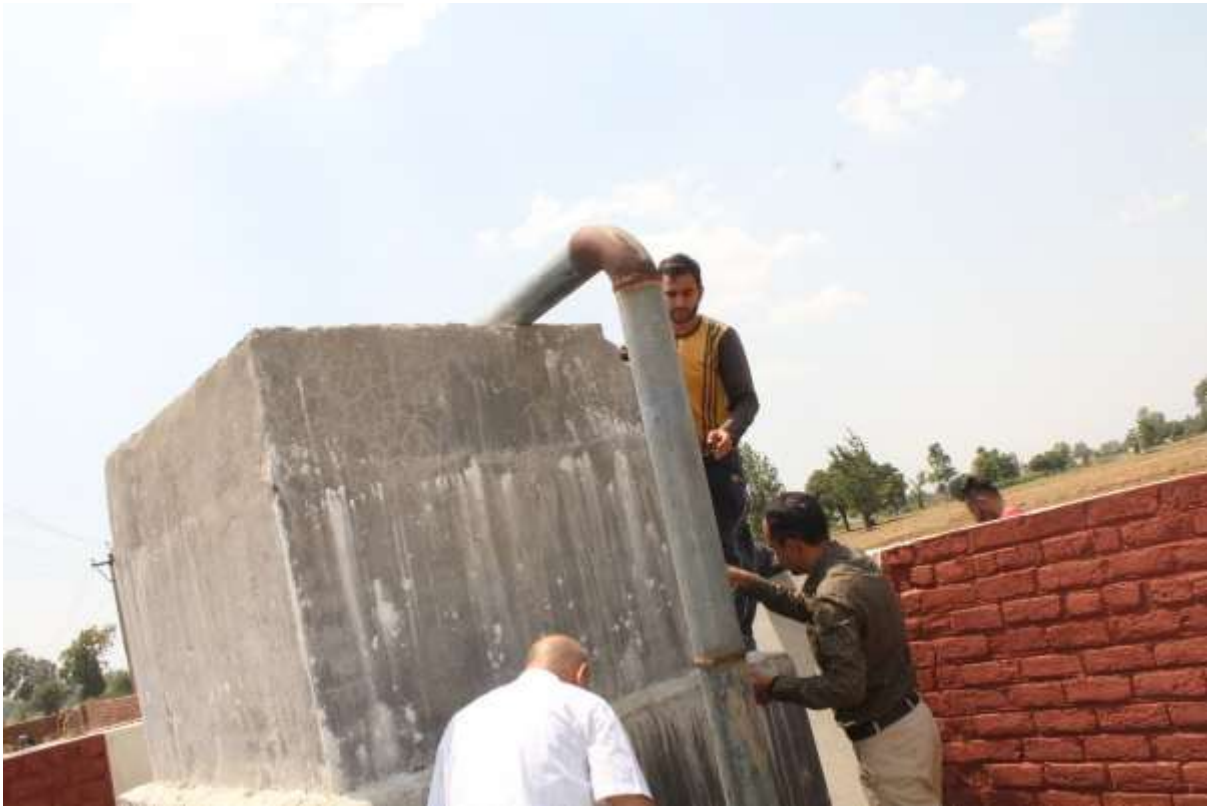

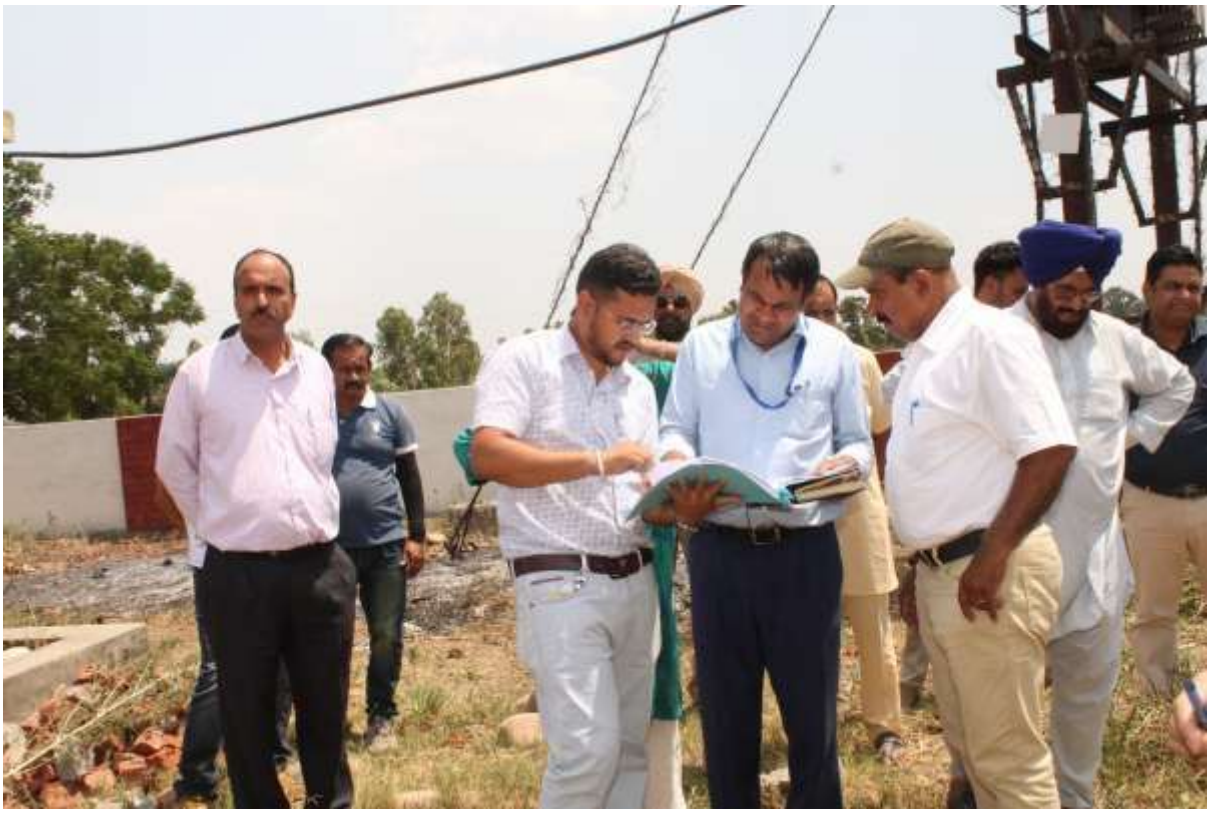

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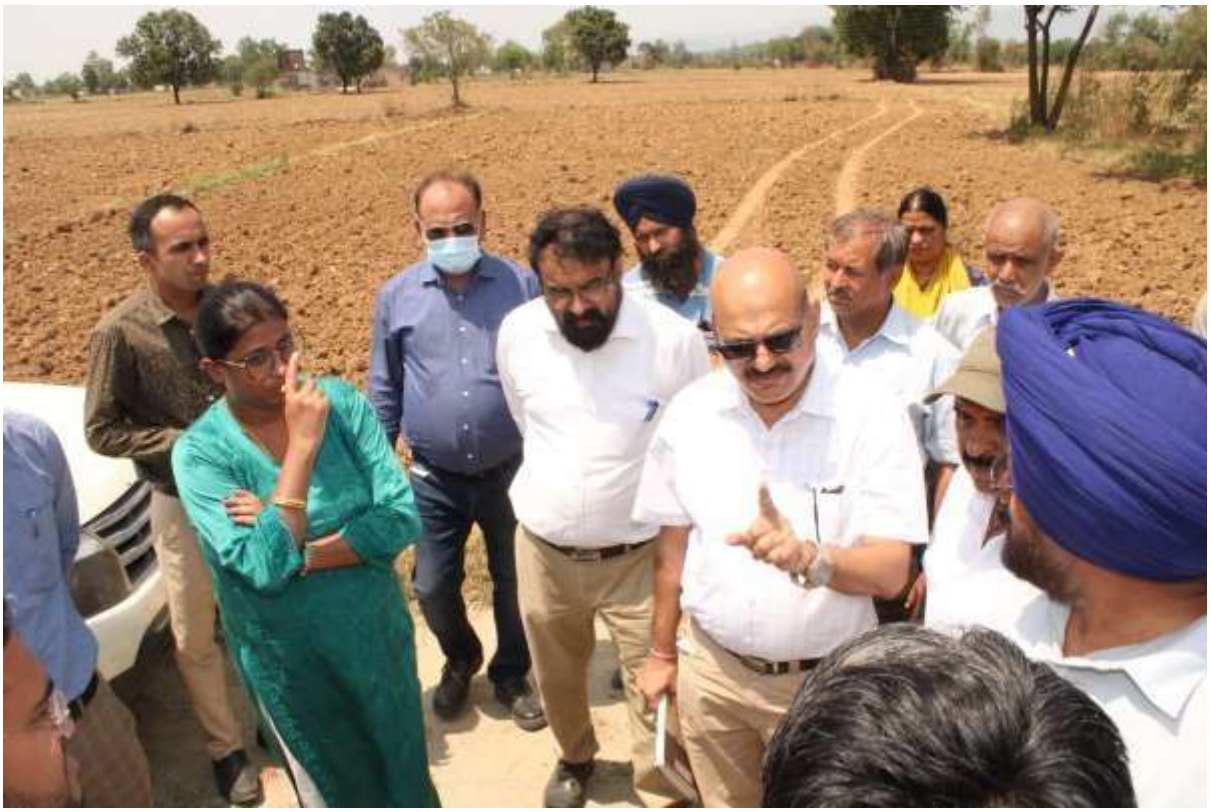

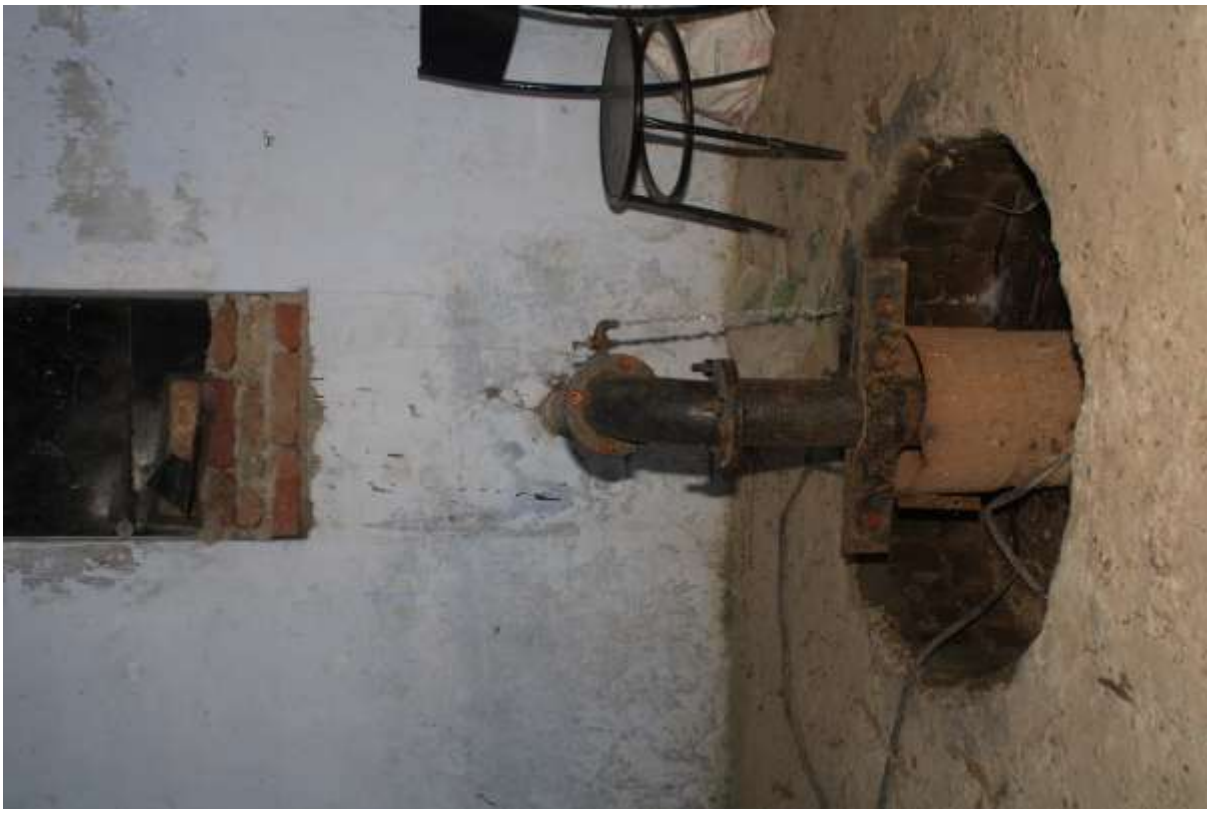

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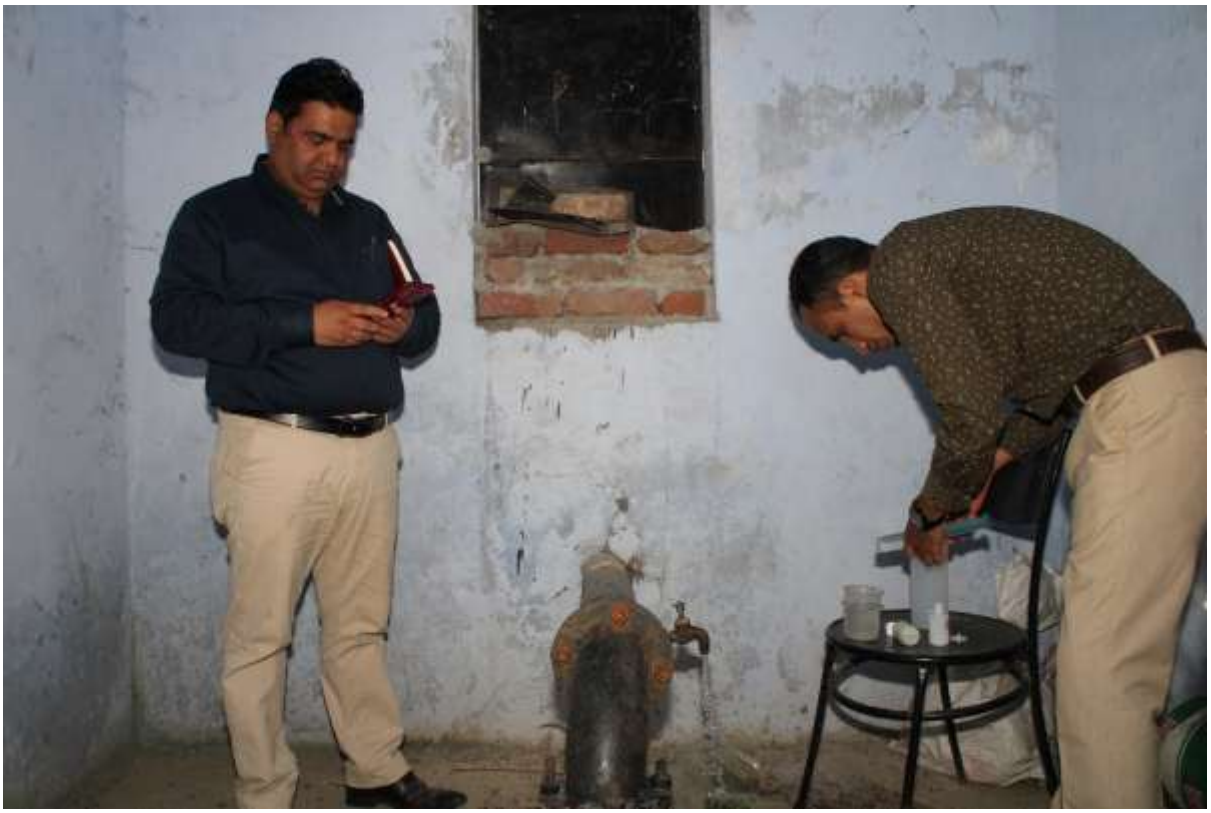

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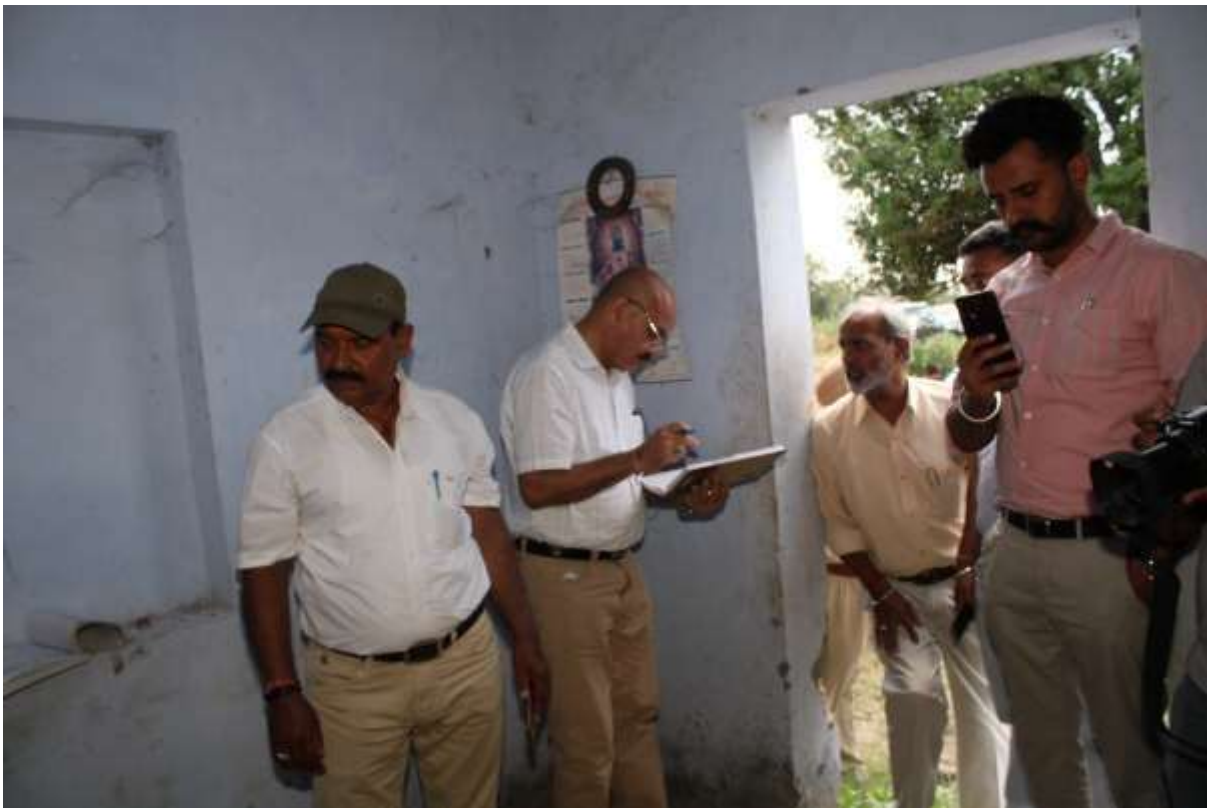

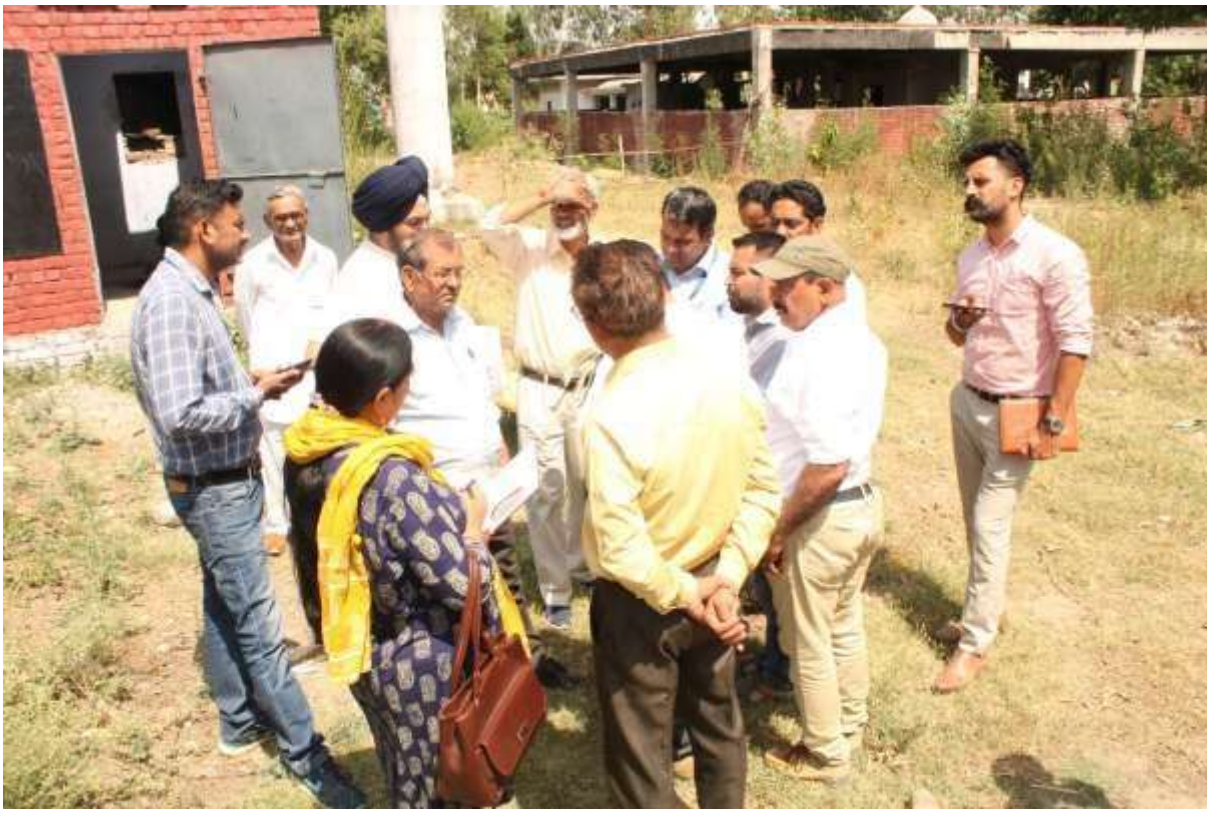

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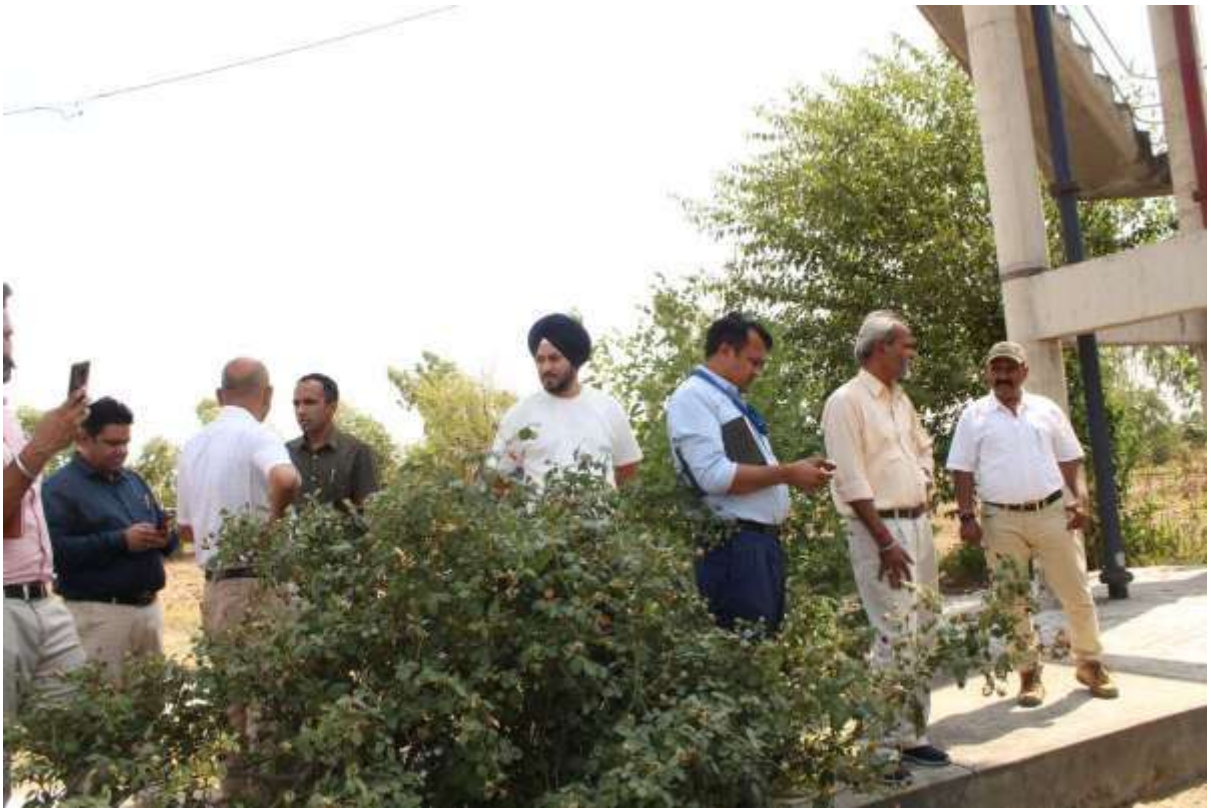

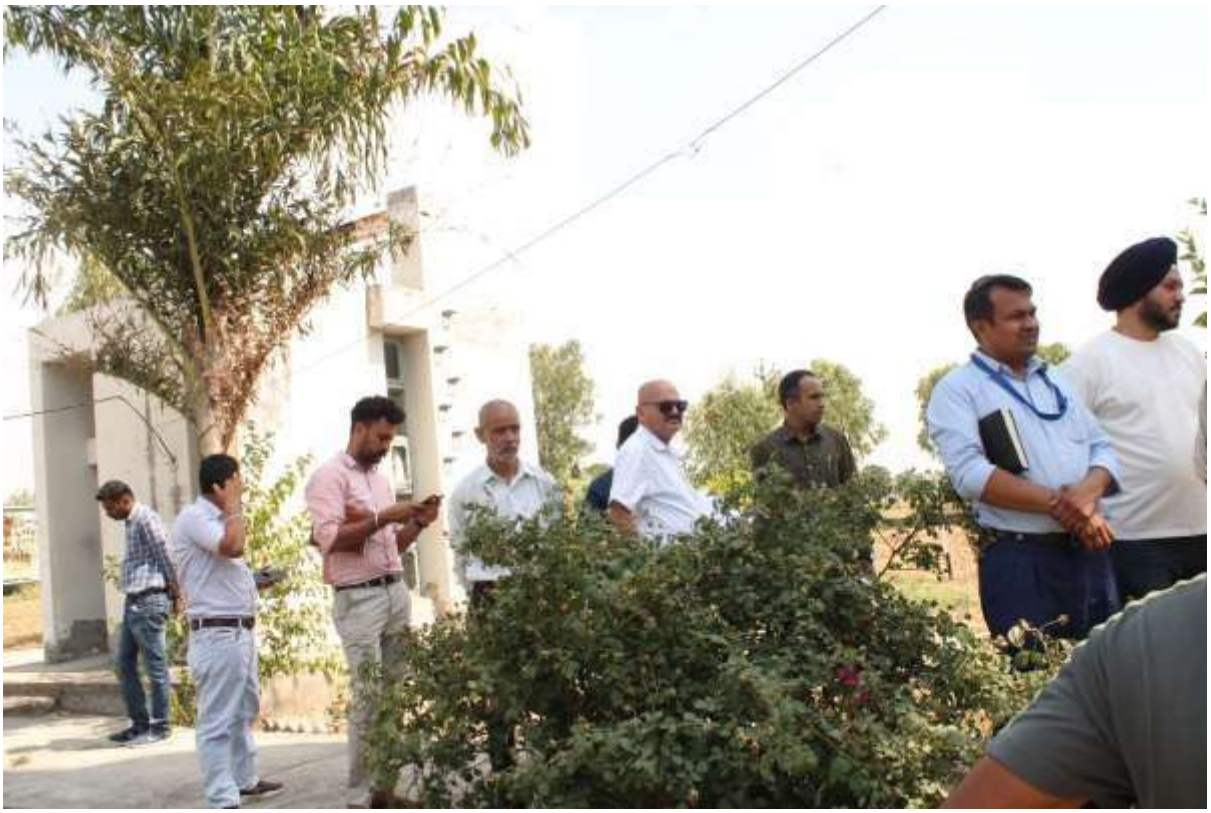

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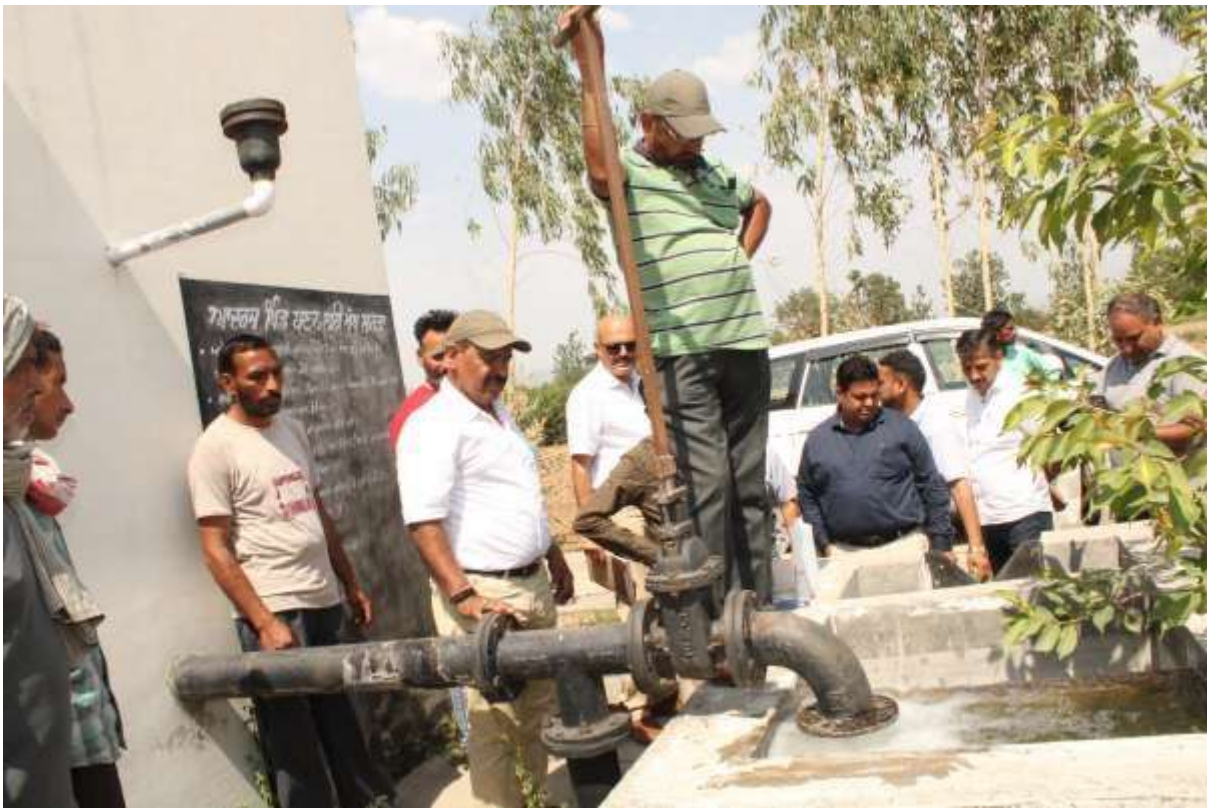

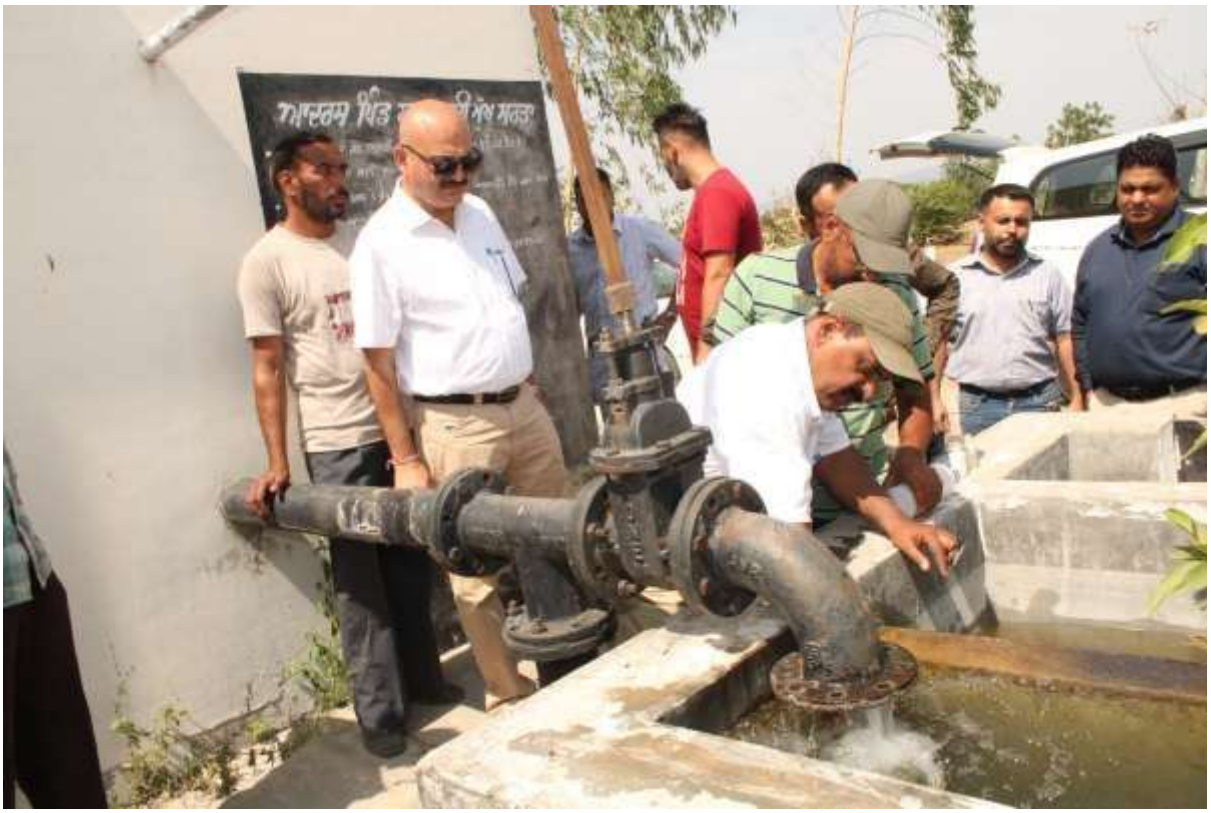

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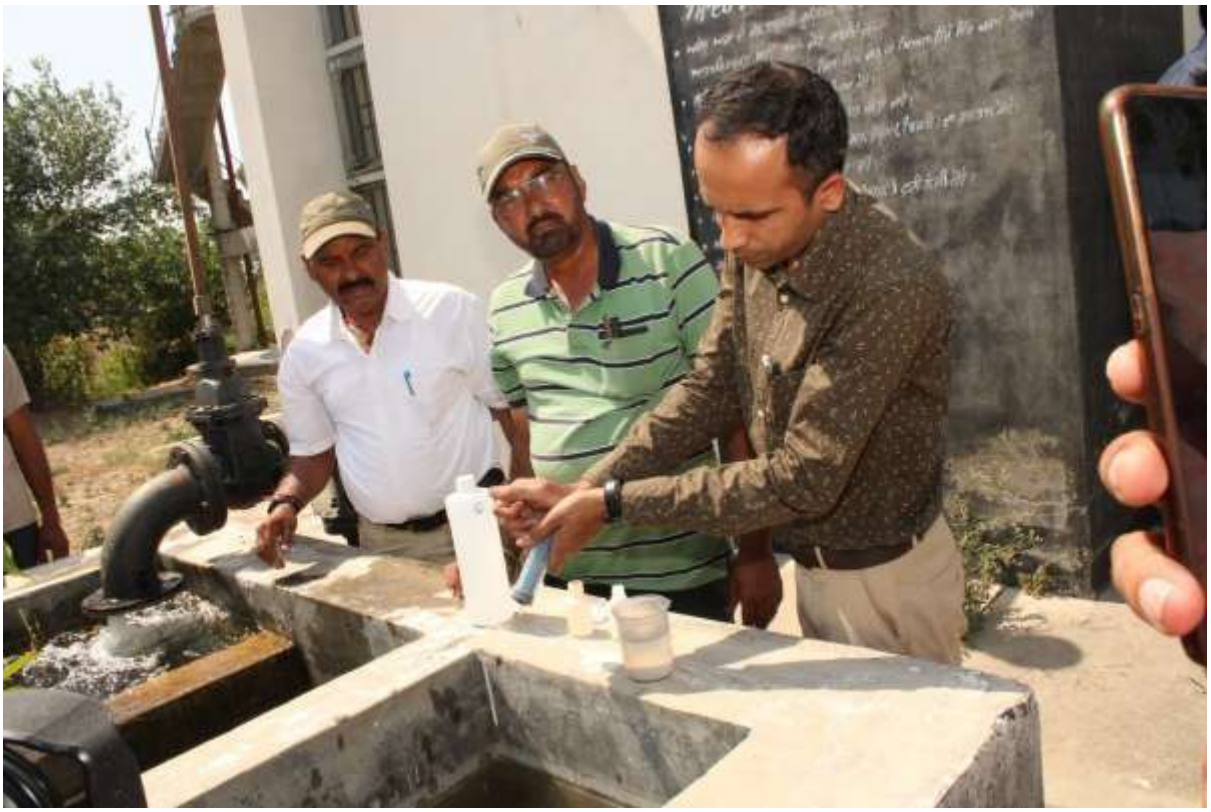

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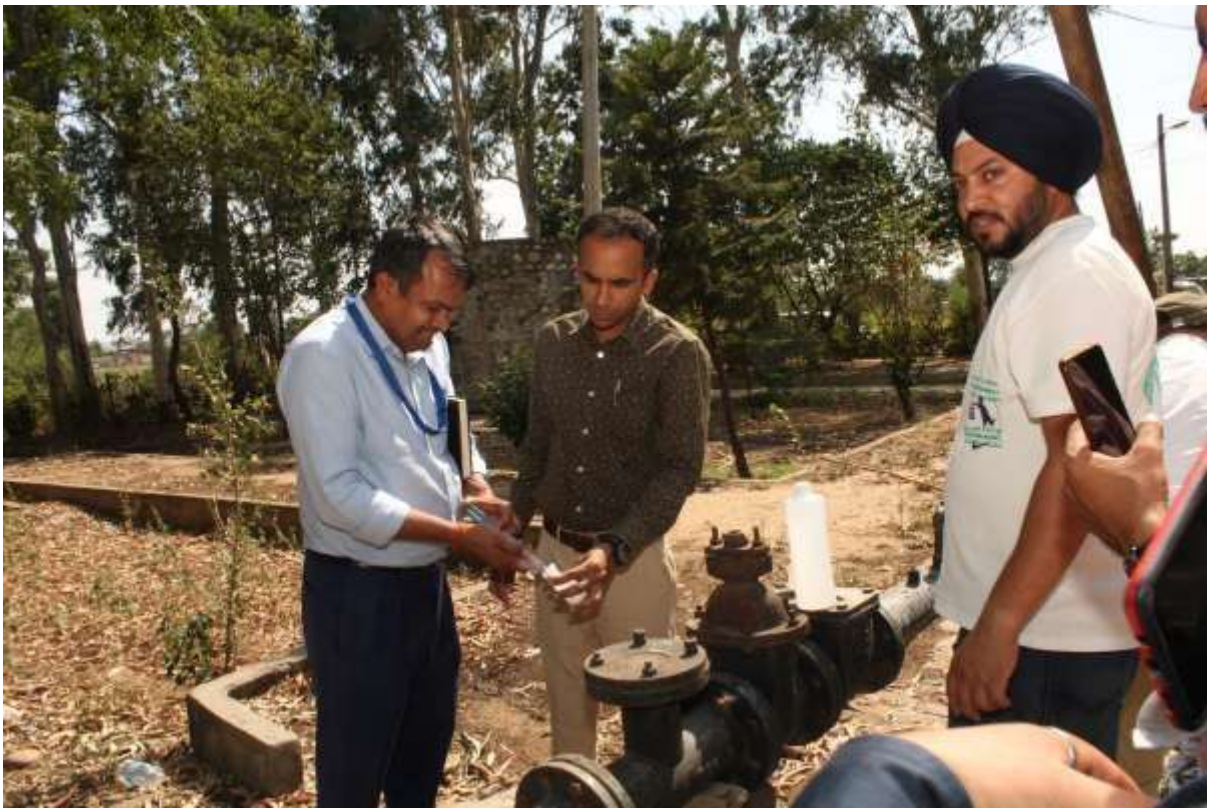

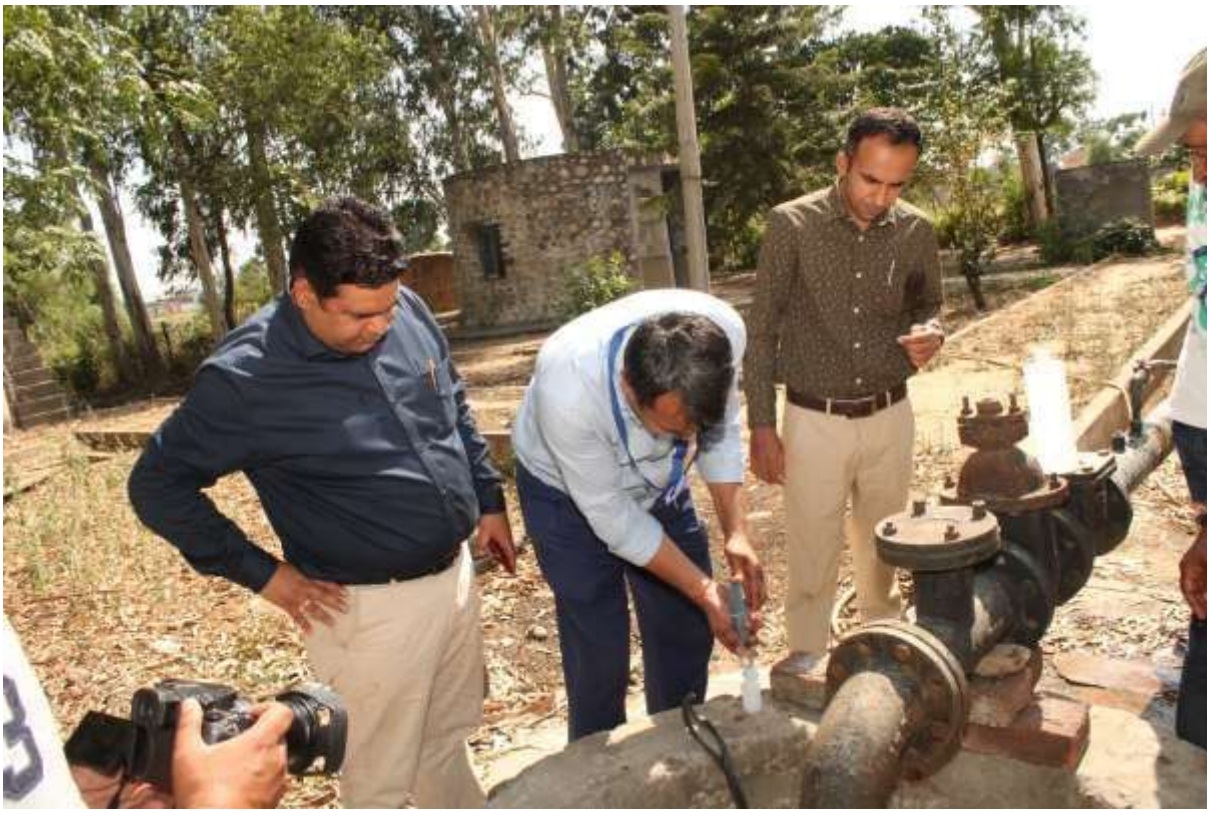

Annexure- A

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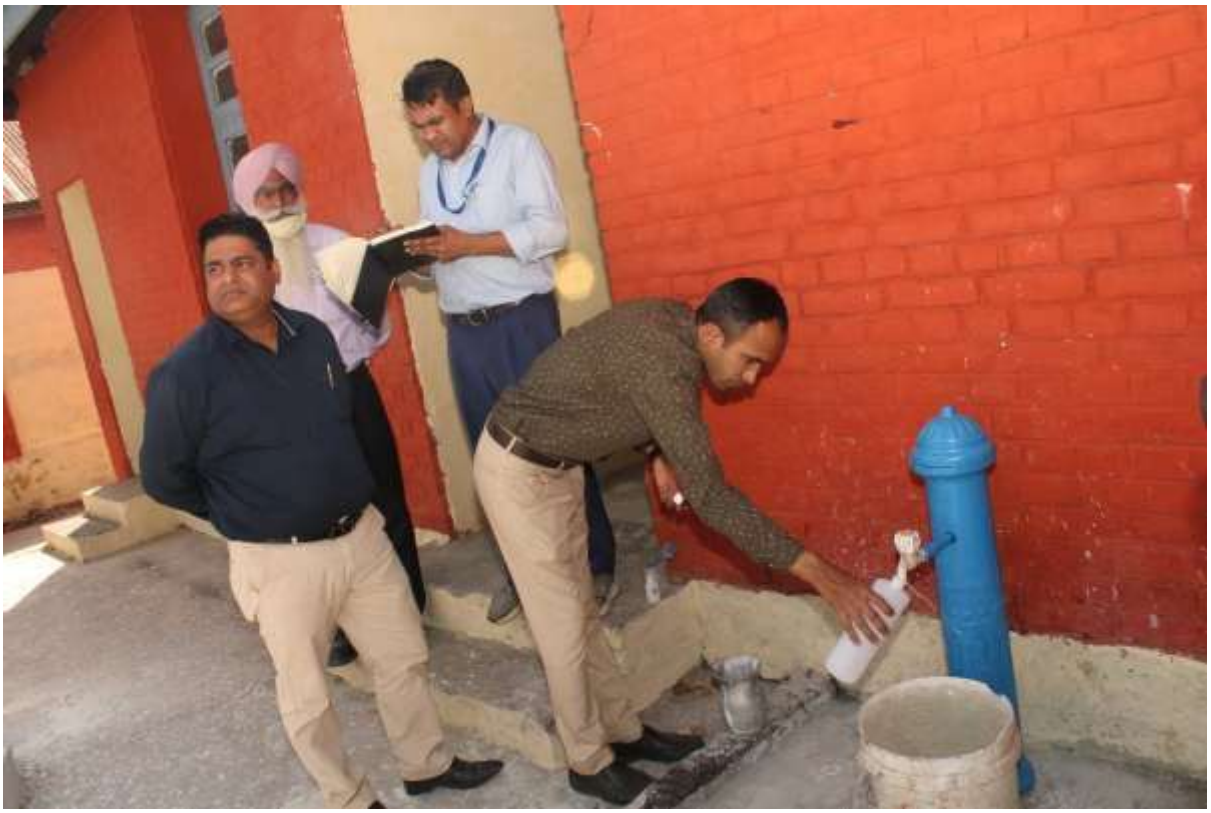

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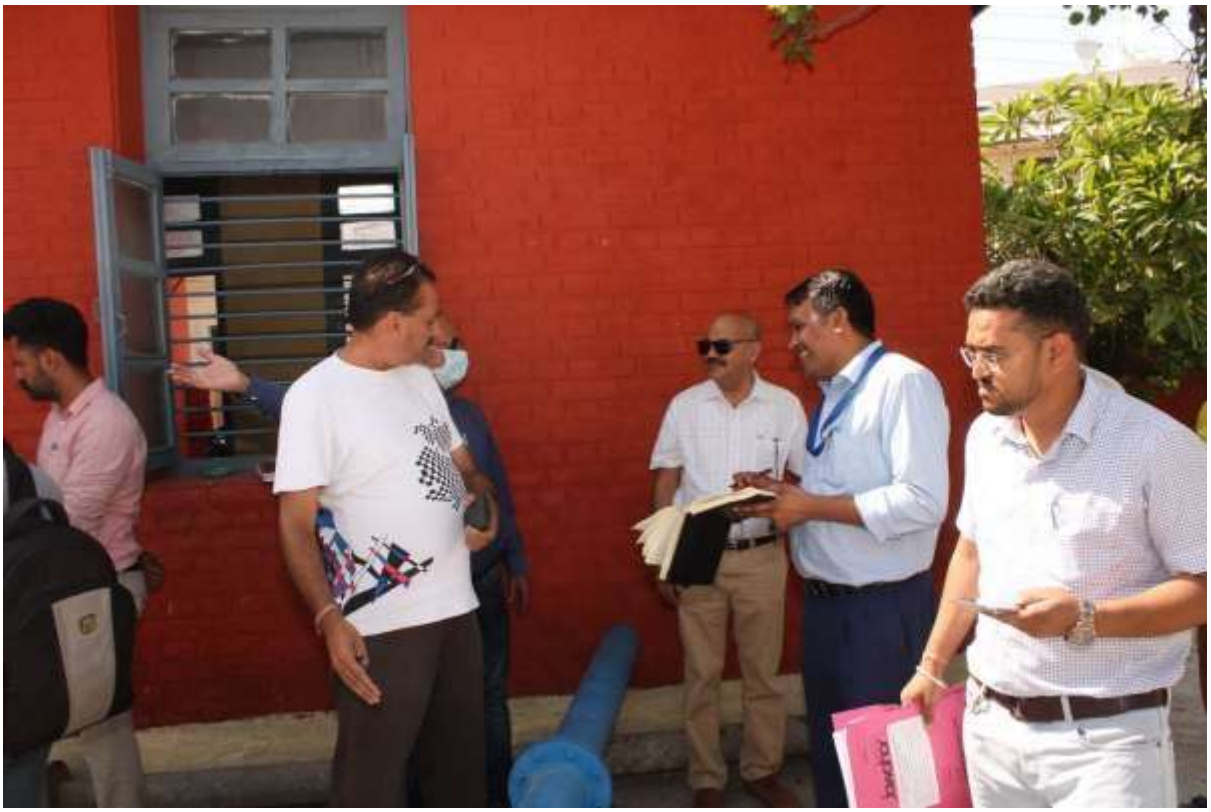

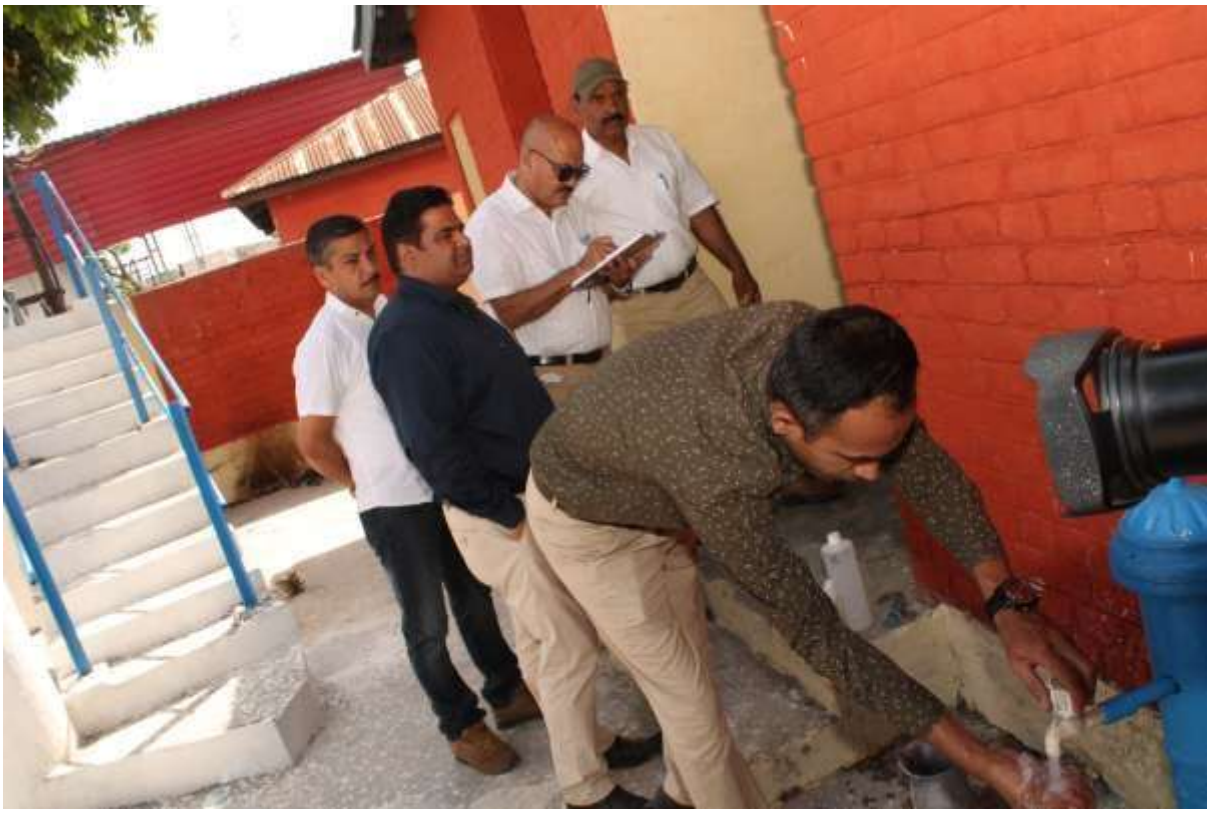

Annexure- B

Test Report of Chemical Analysis of Ground Water Samples

Test Report No.: CHD-202201 **Issue Date:13.06.2022**

Issued to: Sh. Rakesh Rana, Sc-D & Sh. Kiran Lale, STA(C)

Lot No. 03/22

Container: Polypropylene **Quantity: 1L**

Sample Condition: OK

Date of Sample Receipt in Lab: 06.06.2022

Sample Tested at: Regional Chemical Laboratory, CGWB, NWR, Plot No. A3B, Sector-27A, Chandigarh

Sample Origin State: Haryana/**Punjab**/UT of Chandigarh

Study: Systematic/**Pollution**/Hydrograph Network/Short Term/Exploration/NAQUIM/Others/PT/ILC

Sr. No.	Sample ID	Sampling Date	Analysis Date	pH	EC in us/cm at 25° C	Cl	NO_3	F	Ca	Mg	Na	K	TH as $CaCO_3$
						mg/L							
1	10/22	03.06.2022	6-8th June-22	7.12	711	21	31	0.11	49	40	44	5.1	289
2	11/22	03.06.2022	6-8th June-22	7.37	761	35	30	0.21	87	37	15	5	371
3	12/22	03.06.2022	6-8th June-22	7.17	813	56	21	0.09	33	55	39	6.3	309
4	13/22	03.06.2022	6-8th June-22	7.29	1285	210	13	0.17	116	56	41	17	515
5	14/22	03.06.2022	6-8th June-22	7.40	740	48	24	0.12	62	40	32	6	320
6	15/22	03.06.2022	6-8th June-22	7.66	653	14	27	0.11	54	43	30	4	309
7	16/22	03.06.2022	6-8th June-22	7.30	952	62	30	0.13	21	87	21	4.3	412
8	17/22	03.06.2022	6-8th June-22	7.25	791	35	33	0.26	70	37	34	5.3	330

NA: Not Analyzed

Disclaimer:

1. The test results relate only to the sample(s) tested.
2. Sample(s) is not drawn by the lab unless otherwise stated.
3. Results apply to the sample(s) received.

Test Methods:

pH-	APHA 23rd Edition; 4500 H^+ B	Ca	APHA 23rd Edition; 3500 Ca B
EC-	APHA 23rd Edition; 2510 B	Mg	APHA 23rd Edition; 3500 Mg^+ B
Cl-	APHA 23rd Edition; 4500Cl' B	Na	IS 3025 (Pt45) 1993
NO_3-	APHA 23rd Edition; 4500 NO_3' B	K	IS 3025 (Pt45) 1993
F-	APHA 23rd Edition; 4500- F' D	TH	APHA 23rd Edition;

Annexure- B

Test Report of Chemical Analysis of Ground Water Samples

Sender: Sh. Rakesh Rana, Sc-D & Sh. Kiran Lale, STA(C) **Letter: NIL** **Dated: 06.06.2022** **Container: Polypropylene**

Lab No. 03/22 **Quantity: 1L**

State: Haryana/Punjab/UT of Chandigarh **Study: Pollution NGT** **Sample Condition: OK**

***Denotes NABL Accreditated Parameters**

Systematic: **Pollution**/Hydrograph Network/Short Term/Exploration/NAQUIM/Others

Sr. No.	Unique ID	District	Block	Location	Source	Longitude	Latitude	Aquifer	Depth (m)	Sampling Date	Analysis Date	CO_3	HCO_3	SO_4	PO_4	SiO_2	TDS (Calculated)	SAR	RSC
												mg/l							
1	10/22	Una		Majara	TW				90	03.06.2022	8-9th June-22	0	401	0	<0.01	12	427	1.13	0.84
2	11/22	Una		Benewal	TW				110	03.06.2022	8-9th June-22	0	428	0	<0.01	15	457	0.34	-0.37
3	12/22	Una		Malookpur	TW				110	03.06.2022	8-9th June-22	0	364	11	<0.01	18	488	0.97	-0.20
4	13/22	Una		Sanoli	TW					03.06.2022	8-9th June-22	0	397	15	<0.01	21	771	0.78	-3.89
5	14/22	Rupnagar		Mehlama	TW				60	03.06.2022	8-9th June-22	0	397	0	<0.01	11	444	0.78	0.12
6	15/22	Rupnagar		Hazipur	TW				86	03.06.2022	8-9th June-22	0	428	0	<0.01	20	392	0.74	0.78
7	16/22	Rupnagar		Chottewal	TW				70	03.06.2022	8-9th June-22	0	405	12	<0.01	13	571	0.45	-1.57
8	17/22	Una		Ajoli	TW				121	03.06.2022	8-9th June-22	0	412	0	<0.01	14	475	0.82	0.22

Note: The test result relate only to the sample tested

Test Methods:

pH-	APHA 23rd Edition; 4500 H^+ B	Ca	APHA 23rd Edition; 3500 Ca B
EC-	APHA 23rd Edition; 2510 B	Mg	APHA 23rd Edition; 3500 Mg^+ B
Cl-	APHA 23rd Edition; 4500Cl' B	Na	IS 3025 (Pt45) 1993
NO_3-	APHA 23rd Edition; 4500 NO_3' B	K	IS 3025 (Pt45) 1993
F-	APHA 23rd Edition; 4500- F' D	TH	APHA 23rd Edition;

Annexure- B

Test Report of Chemical Analysis of Ground Water Samples

Sender: Sh. Rakesh Rana, Sc-D & Sh. Kiran Lale, STA(C) **Letter: NIL** **Dated: 06.06.2022**

Lab No. 04/22 Quantity: 60 ml

State: Haryana**/Punjab/**UT of Chandigarh Sample Condition: OK

Systematic: **Pollution**/Hydrograph Network/Short Term/Exploration/NAQUIM/Others

Sr. No.	Unique ID	District	Block	Location	Source	Longitude	Latitude	Aquifer	Depth (m)	Sampling Date	Analysis Date	Cr	Mn	Fe	Ni	Cu	Zn	As	Se	Ag	Cd	Pb	U
												mg/l											
1	12T/22	Una		Majara	TW				90	03.06.2022	8-9th June-22	0.0028	0.0502	0.8900	0.0058	0.0016	0.2022	0.0015	0.0032	0.0000	0.0005	0.0024	0.0073
2	13T/22	Una		Benewal	TW				110	03.06.2022	8-9th June-22	0.0027	0.0025	0.6457	0.0045	0.0012	0.1198	0.0006	0.0002	0.0005	0.0006	0.0026	0.0076
3	13T/22	Una		Malookpur	TW				110	03.06.2022	8-9th June-22	0.0021	0.0050	0.9120	0.0058	0.0014	0.2040	0.0016	0.0035	0.0008	0.0004	0.0019	0.0037
4	14T/22	Una		Sanoli	TW					03.06.2022	8-9th June-22	0.0015	0.0023	0.8932	0.0038	0.0010	0.1669	0.0010	0.0018	0.0008	0.0004	0.0017	0.0081
5	15T/22	Rupnagar		Mehlama	TW				60	03.06.2022	8-9th June-22	0.0042	0.0048	0.5881	0.0063	0.0019	0.2018	0.0013	0.0015	0.0005	0.0009	0.0040	0.0054
6	16T/22	Rupnagar		Hazipur	TW				86	03.06.2022	8-9th June-22	0.0016	0.0015	0.4861	0.0028	0.0010	0.1303	0.0011	0.0006	0.0003	0.0004	0.0017	0.0043
7	17T/22	Rupnagar		Chottewal	TW				70	03.06.2022	8-9th June-22	0.0022	0.0022	0.6711	0.0041	0.0011	0.1589	0.0011	0.0010	0.0005	0.0005	0.0021	0.0036
8	18T/22	Una		Ajoli	TW				121	03.06.2022	8-9th June-22	0.0042	0.0049	0.7297	0.0059	0.0014	0.1423	0.0007	0.0004	0.0005	0.0007	0.0035	0.0101

BDL- Below Detection Limit

ND- Not Determined

Annexure- C

Soil Analysis by PBTI (State Level) Punjab

Sample Registration No.	:	PBTI/ENV/030622/000204
Sample code given by customer	:	Village Majara (Nearest Village to M/s PACL, Tehsil & District Una, Himachal Pradesh.

Sample Particulars

Date of Receipt	:	03/06/2022
Name/Nature of Sample	:	Soil
Condition of the sample	:	Intact coded sample
Brand Name	:	NA
Qty/Pkg.	:	1kg approx. in poly bag
Batch No.	:	NA
Date of Manufacture	:	NA/NM
Sampling Method	:	Sample drawn by Joint Committee formed by NGT in presence of PBTI representative Mr. Amit Agarwal
Test Start Date	:	04/06/2022
Test Completion Date	:	16/06/2022

Sr. no.	Parameter	Results	Units
1	pH	8.74	
2.	Conductivity in Soil	0.18	Mmho/cm
3.	Total Nitrogen	1168	mg/kg
4.	Total Organic Carbon (TOC)	0.78	%
5.	Total Kjeldahl Nitrogen (TKN)	841	mg/kg
6.	Phosphorus	133	mg/kg
7.	Sodium (as Na)	210	mg/kg
8.	Potassium (K2O)	64.8	mg/kg
9.	Nitrate Nitrogen	249	mg/kg
10	Ammonical Nitrogen	78	mg/kg
11	Calcium Carbonate	0.1	%
12	Gypsum Requirement	1765	Meq/100gm
13	Chloride (as Cl)	224	mg/kg
14	Sodium Adsorption Ratio	0.2	USDA Guidelines

Annexure- C

Soil Samples by Department of Agriculture, Himachal Pradesh

In compliance to the directions issued by worthy Deputy Commissioner, Una, District Una, Himachal Pradesh in the meeting on dated 24/05/2022, the department of Agriculture, Una, HP conduct the joint monitoring alongwith Jal Shakti Vibhag and Pollution Control Board, Una (HP) in village Sanoli, Majara, Benewal, Malookpur of Tehsil & District Una (HP) for soil sampling (from Sr. No. 1 to 8) on dated 29/05/2022 in presence of representatives of Gram Panchayats.

List of the soil samples drawn from the affected villages of District Una (HP):

Sample No.	Name of Farmers	Village
1	From the complex of water supply scheme	Sanoli
2	Sh. Sukhdev Sharma S/o Sh. Munshi Ram	Sanoli
3	Sh. Balvir Singh S/o Sh. Phuman Singh	Malookpur
4	Sh. Surinder Singh S/o Sh. Sarwan Singh	Malookpur
5	Sh. Lakhvir Singh S/o Sh. Joginder Singh	Benewal
6	Tubewell No. 13	Benewal Puna
7	Sh. Balvir Singh S/o Sh. Jagat Ram	Majara
8	Sh. Bhag Singh S/o Sh. Bakshi Ram	Majara
9	PACL Boundary Wall	Boundary Wall near Benewal
10	Sh. Rupinder Singh S/o Sh. Karam Singh (Control)	Upper Dehlan

In the same way, the soil samples (Sr. No. 9) was drawn near the boundary wall of PACL, which is situated towards village Benewal in the presence of the Sub-Divisional Magistrate, Una, (HP), Additional Deputy Commissioner, Rupnagar (Punjab) alongwith the officials of Department of Agriculture, Una (HP), Jal Shakti Vibhag, Una (HP), Pollution Control Board, Una (HP) as well as the Central Pollution Control Board, Chandigarh, Department of Agriculutre, Shri Anandpur Sahib, Punjab and representatives of Gram Panchayats of District Una, Himachal Pradesh on dated 03.06.2022. The soil samples (Sr. No. 9) was taken by Department of Agriculture, Una (HP) & Shri Anandpur Sahib, Punjab was sent to the Department of Soil Science. CSKHPKV, Palampur, Himachal Pradesh as well as PAU, Ludhiana, Punjab for the testing analyses of 15 parameters (listed as under).

Annexure- C

Soil samples analyses on the basis of different parameters:

1. Nitrogen
2. Phosphorus
3. Potassium
4. pH
5. Organic Carbon
6. Electrical Conductivity
7. $CaCO_3$
8. SAR
9. TKN (Total Kjeldahl Nitrogen)
10. $CaSO_4 10H_2O$
11. Chloride
12. Sodium
13. Ammonia Nitrogen (NH_3-N)
14. NO_3-N
15. Gypsum requirement

The Department of Soil Science, CSK HPKV, Palampur analysed only 13 parameters out of total 15 parameters (from Sr. No. 1 to 15 except Sr. No. 10 & 15 not tested/analyzed).

The analysis report alongwith findings of the above enlisted samples as submitted by the Department of Soil Science, CSK HPKV, Palampur is as under:

Sr. no.	**pH**	**EC (dS/m)**	**OC (%)**	**N (kg/ha)**	**P (kg/ha)**	**K (kg/ha)**	**NH_4- N ppm**	**NO_3-N ppm**	**Total N ppm**	**$CaCO_3$ (%)**	**Na c mol (p) kg**	**SAR**	**Cl m/lit**
1.	5.84	6.08	1.54	376	13.88	338	109	82	661	3.0	0.33	0.20	1.27
2.	6.60	6.13	1.87	345	21.37	286	140	85	885	0.5	0.18	0.16	0.37
3.	6.64	6.20	0.70	282	16.38	416	111	72	549	0.5	0.28	0.22	1.05
4.	5.47	6.50	1.26	376	21.11	301	126	79	627	0.4	0.77	0.43	1.46
5.	6.04	5.72	0.96	345	15.35	265	117	69	616	0.4	0.60	0.40	0.92
6.	5.65	5.80	1.00	439	11.56	323	155	93	907	0.3	0.25	0.15	0.34
7.	6.07	6.15	0.67	376	12.85	292	166	97	918	0.3	0.54	0.42	0.18
8.	6.10	5.00	0.97	408	12.08	378	120	68	885	0.3	0.36	0.23	0.17
9.	5.97	4.71	0.56	345	11.23	286	126	79	661	0.3	0.63	0.46	0.83
10.	7.04	7.06	1.36	376	13.23	315	97	58	526	3.6	0.47	0.27	0.49

Annexure- C

For reference

Parameter	**Medium range/Thresh hold value**
Availbale Nitrogen (kg/ha)	280-560
Available Phosphorus (kg/ha)	10-25
Available Potassium (kg/ha)	118-280
Soil pH (1:2.5)	6.5-7.5
Electrical Conductivity (dS/m) (1:2)	<4
Organic Carbon (%)	0.5-1.0
SAR	<13
Sodium (c mol(p^+)/kg)	<1

Soil Testing Findings

- Soil samples were strongly acidic to neutral in soil reaction.
- Organic carbon was medium to high in range.
- EC of soil samples was more than 4 dS/m (Unfavorable for cultivation of most crops).
  (Recommendation: Irrigating the soil with good quality water & cultivating salt tolerant crops).
- Available N & P were in medium range, whereas, available K was reported high in samples.
- Sodium Adsorption Ratio was less than 13 (Safe Range).

❖ Determination of gypsum requirement and $CaSO_4.10H_2O$ could not be possible because analysis of these showing some errors.