आपदा सेवा सर्वत्र

रा. आ. मो. बल • भारत

NDRF • INDIA

जीवन रक्षा से भी आगे...

Saving Lives & Beyond...

BOREWELL RESCUE PRECIS

Foreword:

In a country like India, where the majority of the population still relies on groundwater for drinking, irrigation, and daily sustenance, borewells have become an integral part of rural life. These deep wells tap into underground aquifers, providing much-needed water to areas that might otherwise face severe water scarcity. However, with the increasing dependence on borewells, the risks associated with their operation have also grown significantly.

The tragic incidents of children falling into open or improperly covered borewells have become a haunting reminder of the dangers posed by these seemingly simple structures. Over the years, India has witnessed several heart-wrenching rescues, some successful and others not, which have drawn national attention and sparked conversations around safety measures, regulations, and rescue operations. The ingenuity, bravery, and determination displayed by rescue teams in such operations are often nothing short of extraordinary, but they also highlight critical gaps in safety standards and infrastructure.

This precis seeks to explore the various dimensions of borewell rescues in the Indian context, shedding light on the complexities of these operations, the technology employed, and, most importantly, the human stories behind each rescue. Through a blend of real-life case studies, expert opinions, and detailed analysis, it aims to not only highlight the heroic efforts of our rescue teams but also raise awareness about the safety measures and preventive practices that need to be adopted to avoid such incidents.

I extend my sincere appreciation to the Board of Officers, under the leadership of Shri Pranshu Srivastava, 2IC (Training), NDRF HQ, for their dedication and hard work in preparing this invaluable resource. I am confident that this precis will serve as a vital tool for equipping our rescuers with the knowledge and skills needed for effective and efficient disaster response, fulfilling our goal of providing a standard reference for training.

Shri Piyush Anand, IPS
Director General, NDRF

Foreword:

It In the past few years, there have been many deadly incidents of children accidentally falling into Bore wells, most of which were uncovered, abandoned and illegally drilled in order to extract water in areas where groundwater is depleting. Bore well rescue operation is one of the difficult, complicated and lengthy which requires due meticulousness and carefulness. Often requirement of heavy machinery is also felt. Though with great efforts NDRF and other agencies have been able to save some precious lives, but still prevention through awareness can help in preventing such incidents. National Disaster Response Force (NDRF) has prepared an inclusive precise designed specifically for the bore well rescuers.

Bore well rescue operations have required multi-faceted approach involving specialized equipment, trained personnel, and a well-coordinated response to minimize risk and maximize the chances of a successful rescue. Key aspects include rapid assessment, using technical or manual methods, ensuring oxygen supply and communication, and continuous monitoring of the child's condition. National Disaster Response Force (NDRF) has prepared an inclusive precise designed specifically for the bore well rescuers.

I am sure this Précis will be of immense value to NDRF Rescuers in obtaining the requisite knowledge and skills needed for an effective and efficient Borewell response and fulfil the need of a standard reference material by the trainees.

Sh Narendra Singh Bundela, IPS
Inspector General, NDRF

Foreword:

India, recently has witnessed some of the most tragic but helpless incidents which touched us deeply and forced us to look after the matter seriously. The most mournful fact is most the victim is under the age of 10. The children were playing around the bore well unaware of the fact that the bore well was waiting for them in the form of a death trap. But the lack of oxygen and deadly atmosphere has taken their life slowly before the rescue team can reach them. Borewell rescue training focuses on equipping personnel with the knowledge and skills to safely and efficiently rescue individuals, especially children, who have fallen into borewells. In this training includes understanding the risks associated with borewell incidents, utilizing specialized rescue equipment, and coordinating rescue operations effectively. The goal is to minimize casualties and ensure the victim's well-being during and after the rescue. I hope that this handbook of Bore well rescue will prove to be helpful not only to NDRF rescuers but other stakeholders as well. It will also guide all the stakeholders to adopt a certain level of uniformity in response.

I extend my heartfelt gratitude to the team members specially **Sh. Praveen Kumar, AC, from 6th NDRF** who has given his valuable contribution for this book, whose extensive experience in Borewell Rescue operations and his active involvement will enrich the content.

While utmost care was taken with dedicated efforts in compiling this handbook, there is always scope for improvement. I hope this handbook will be help to borewell rescuers as well as the NDRF instructors in their efforts and initiatives towards building a disaster resilient society. Suggestions and comments are always needed and will be welcomed.

I also express my deep gratitude to Shri Piyush Anand, IPS Director General, NDRF and Shri Narendra Singh Bundela, IPS, Inspector General, for their invaluable guidance and encouragement throughout this project. Their support has been a cornerstone of this accomplishment.

Sh. Bharat Bhushan Vaid
DIG/Trg, NDRF

BOO/TEAM CONTRIBUTION

This book has been prepared by the dedicated efforts of well experienced and knowledgeable team members which comprising, Shri Pranshu Srivastava, Second-In-Command, NDRF HQ, Shri Praveen Kumar, Asstt Commandant, 06th NDRF, and Shri Kaushal Kumar, Asstt Commandant, 09th NDRF. The efficient team has diligently compiled vital information to equip rescuers with the skills and understanding needed in challenging situations.

The contents of this book have been taken from various sources mentioned in bibliography and content has been newly prepared and integrates the practical insights of NDRF personnel with global best practices. This content will be utilized for Training of BOREWELL Course only.

The Board is thankful to all units and NDRF Academy who have given their valuable inputs to enrich the content of BOREWELL precis.

****

BOREWELL RESCUE PRECIS

CONTENT

Module - B

Borewell Rescue (03 Days)
Detailed Syllabus

S. No.	Topic	Period to be assigned			
		L	D	P	Total
1.	**Introduction about borewell rescue & its need:** Definition of borewell, types of borewell related incidents in India & abroad, injuries/casualties from borewell incidents, requirements for borewell rescue.	02	-	-	02
2.	**Legal aspect of borewell & Media management:** Supreme court guidelines on borewell, SOP issued by NDRF HQ, Media management during borewell rescue operation	02	-	-	02
3.	**Operational requirement of borewell rescue:** Borewell rescue equipment, Supportive borewell rescue equipment, technical borewell rescue equipment etc.	02	-	-	02
4.	**Borewell rescue equipment:** Pendent Jhula method, Magic Ball method, Cloth bucket method, POP casting method, Cane and stick method, three loop of rope method, J hook method, Umbrella method, Single bracket method, Multi bracket method, Universal Jhula, Universal rounded Jaal yantra, O-ring, Sand & Maurang method and technical method etc.	-	02	08	10
5.	**Heavy Earth mover, Parallel digging and soil strata**	02	-	-	02
6.	**Care of Children in borewell**: Position of child, condition of child, Consider the probable rescue time, Plan for care of child, food, medication, Oxygen supply, light, motivation, moral support.	01	-	-	01
7.	**Case study:** Syndicate wise case study & experience sharing.	03	-	-	03
8.	**Final Written and Practical Test**	01	-	02	03
9.	Feedback & Closing	02	-	-	02
Total		**15**	**02**	**10**	**27**

SYLLABUS OF BORE WELL RESCUE COURSE FOR NDRF PERSONNEL

TRAINING PROGRAMME (06 DAYS)

1. BLOCK TIME TABLE

1.	**Duration of course**	**06 days**
2.	Total working days during course	06 days
3.	No. of period in a day	08
4.	Total period during course	48
5.	Duration of a period	40 Minutes

BLOCK SYLLABUS OF BORE WELL RESCUE COURSE

SL NO.	Modules	Periods To Be Assigned			
		Theory	Demo/ activity	Prac	Total
1.	Registration and opening address	2	-	-	**2**
2.	Introduction about bore well rescue and its need	2	-	-	**2**
3.	Legal aspect of bore well & Media management	2	-	-	**2**
4.	Operational requirement of bore well rescue	2	-	-	**2**
5.	Bore well rescue equipment	2	3	23	**28**
6.	Heavy Earth mover, Parallel digging and soil strata	2	-	-	**2**
7.	Care of children in bore well	2	-	-	**2**
8.	Case study	4	-	-	**4**
9.	Group exercise	-	2		**2**
10.	Course closing and Feedback	2	-	-	**2**
	Total	**20**	**5**	**23**	**48**

DETAIL SYLLABUS OF BORE WELL RESCUE COURSE

SL NO.	Topic	Periods To Be Assigned			
		Theory	Demo/ activity	Prac	Total
1.	**Registration and opening address:** Aim of the course, course design, objective, course duration, course contents, training methodology.	2	-	-	**2**
2.	**Introduction about bore well rescue& its need:** Definition of bore well, types of bore well, bore well related incidents in India & abroad, injuries/causalities from bore well in India, needs of bore well rescue.	2	-	-	**2**
3.	**Legal aspect of bore well & Media management:** Supreme court guidelines on bore well, SOP issued by NDRF HQ & Other guidelines Media management in bore well rescue, Role of media during bore well rescue,	2	-	-	**2**
4.	**Operational requirement of bore well rescue:** Bore well rescue equipment, Supportive bore well rescue equipment, technical bore well rescue equipment etc.	2	-	-	**2**
5.	**Bore well rescue equipment:** Pendent jhula method, Magic ball method, Cloth bucket method, POP casting method, Cane and stick method, Three loop of roap method, L bracket and two loop of Roap method, J hook method, Umbrella method, Single bracket method, Multi bracket method, Universal jhula, O-ring, Universal rounded jaalyantra, Sand & maurang method and technical method etc.	2	3	21	**26**
6.	**Heavy Earth mover, Parallel digging and soil strata**	2			**2**
7.	**Care of children in bore well:** Position of child, Condition of child, Consider the probable rescue time, Plan for care of child, Food, Medication, Oxygen supply, Light motivation, Moral support.	2	-	-	**2**

8.	**Case study:** Syndicate wise case study & experience sharing	4	-	-	**4**
9.	**Group exercise**	-	2	2	**4**
10.	**Course closing and Feedback**	-	-	2	**2**
	TOTAL	**18**	**5**	**25**	**48**

BOREWELL RESCUE COURSE FOR NDRF/ SDRF 03 DAYS

TRAINING SCHEDULE

Duration of course	03 days.
No. of Sunday / holidays	Nil.
Total working days	03 days.
Course schedule	w.e.f.
No. of periods in a day	08 periods
Total no. of periods available :- 24	03 x 08= 24

BLOCK SYLLABUS OF BORE WELL RESCUE COURSE

SL NO.	Modules	Periods To Be Assigned		
		Theory	Demo/ Prac	Total
11.	Registration and opening address	02	-	**2**
12.	Introduction about bore well rescue and its need	02	02	**04**
13.	Legal aspect of bore well & Media management	01	-	**01**
14.	Care of children in bore well	01	-	**01**
15.	Bore well rescue equipment	02	08	**10**
16.	Case study bore well	01	-	**01**
17.	Examination	1	-	**1**
18.	Closing address/valediction	4	-	**4**
	Total	**14**	**10**	**24**

DETAIL SYLLABUS OF BORE WELL RESCUE COURSE

SL NO.	Topic	Periods To Be Assigned		
		Theory	Demo/ Prac	Total
1	**Registration and opening address:** Aim of the course, course design, objective, course duration, course contents, training methodology.	02	-	**02**
2	**Introduction about bore well rescue & its need:** What is bore well, types of bore well, bore well related incidents in India & abroad, injuries/causalities from bore well in India, needs of bore well rescue.	02	02	**02**
3	**Legal aspect of bore well & Media management:** Supreme court guidelines on bore well, SOP issued by NDRF HQ & Other guidelines Media management in bore well rescue, Role of media during bore well rescue,	01	-	**01**
4	**Care of children in bore well:** Position of child, Condition of child, Consider the probable rescue time, Plan for care of child, Food, Medication, Oxygen supply, Light motivation, Moral support.	01	-	**01**
5	**Bore well rescue equipment:** Pandent jhula method, Magic ball method, Cloth bucket method, POP casting method, Cane and stick method, Three loop of roap method, L bracket and two loop of Roap method, J hook method, Umbrella method, Single bracket method, Multi bracket method, Universal jhula, Universal rounded jaal yantra, Sand & maurang method and technical method etc.	02	08	**10**
6	**Case study:** Syndicate wise case study & experience sharing	01	-	**01**
7	**Examination:** Written test	01	-	**01**
8	**Closing address/valediction**	04	-	**04**
	TOTAL	**14**	**10**	**24**

DAILY SHEDULE OF BORE WELL RESCUE COURSE

0940-1000	**Recapitulate**
1000-1040	I Period
1045-1125	**Tea Break**
1125-1140	II Period
1140-1220	III Period
1225-1305	IV Period
1305-1435	**Lunch Break**
1435-1515	V Period
1520-1600	VI Period
1600-1615	**Tea Break**
1615-1655	VII Period
1700-1740	VIII Period
1740-1750	**Daily Class Evaluation**

NOTE: - ***The above schedule may vary as per the season.***

ABBREVATIONS

BP	Blood Pressure
CPR	Cardio Pulmonary Resuscitation
CGWA	Central Ground Water Authority
CSSR	Collapsed Structure Search & Rescue
DC	Deputy Collector
DM	District Magistrate
DTH	Down the Hole Hammering
DDMA	District Disaster Management Authority
GPS	Global Positioning System
GPH	Gallons Per Hour
HCB	High Capacity Borewell
KVA	Kilo Volt-Ampere
LCB	Low Capacity Borewell
LED	Light Emitting Diode
LPG	Liquefied Petroleum Gas
MHA	Ministry of Home Affairs
MCB	Medium Capacity Borewell
MT	Motor Transport
NCMC	National Crisis Management Committee
NEC	National Executive Committee
NDRF	National Disaster Response Force
NDMA	National Disaster Management Authority
NiMH	Nickel Metal Hydride
NOC	No Objection Certificate
OBM	Out Board Motor
ODRAF	Orrisa Disaster Rapid Action Force
OPS	Operation
PPE	Personal Protective Equipment
MFR	Medical First Responder
PTSD	Post Traumatic Stress Disorder
QDA	Quick Deploy Antenna
SAR	Search and Rescue
SCBA	Self-Contained Breathing Apparatus
SOP	Standard Operating Procedure
SS	Stainless Steel
SDMA	State Disaster Management Authority
TEA	Tools, Equipment and Accessories
UT	Union Territory

Lesson No. 01

Introduction about Borewell rescue & its need:

Objectives:

1.1 Introduction to Borewell Rescue Operations.

1.2 Definition of a bore well.

1.3 Types & Classification of Borewells.

1.4 Borewell related incidents in India & abroad.

1.5 Main Causes of Borewell Accidents

1.6 Lack of Regulatory Framework

1.7 Injuries/causalities from bore well in India,

1.8 Requirements for borewell rescue.

1.9 Key requirements for successful borewell rescue

1.1 Introduction to Borewell Rescue Operations:

Borewell rescues, especially those involving children, inflict profound and lasting psychological trauma on the families involved, regardless of the outcome. For many, the incident is the most horrifying experience of their lives, and the psychological impact can be debilitating for years.

The days-long rescue process is an excruciating ordeal for family members, often unfolding in full view of the public and media. This period is marked by an intense state of psychological and emotional distress. Parents are forced to witness the prolonged suffering of their child while being unable to do anything to help. They must put their faith in the hands of rescue workers and technology, and the slow pace of the effort only increases their agony.

The constant cycle of hope and despair puts an immense emotional toll on the family. Media reports frequently describe the distraught and desperate state of mothers pleading for their child's rescue. The stress can also manifest physically, with reports of parents refusing to eat or sleep during the ordeal.

The intense media scrutiny and crowds of onlookers disrupt the family's privacy and add pressure to an already unbearable situation. In some cases, families are forced to publicly confront authorities over perceived negligence or delays in the rescue effort.

Psychological impacts following the rescue:

Whether the child is saved or not, the incident leaves permanent scars on the family. In cases of a child's death, the loss of a child in such a traumatic and public manner is a devastating experience. The parents are left to mourn a preventable tragedy that unfolded for days, compounding their grief. The memory of the event and the prolonged suffering of their child can haunt parents for years, making it difficult to find closure. Families may grapple with feelings of blame, guilt, or regret, questioning whether they could have prevented the accident. They may also direct anger and blame toward authorities for the outcome.

In cases of a successful rescue; even when a child is rescued, the family still endures the trauma of the near-fatal incident. They may experience symptoms of Post-Traumatic Stress Disorder (PTSD), such as flashbacks, nightmares, and anxiety. Rescued children and their families may live with long-term anxiety and fear of similar incidents. Some parents of rescued children report that the emotional weight of the experience continues to affect them long after the event.

Impact on Communities:

Borewell tragedies are extremely devastating for a community; the losses are immense and the survivors grieve. The overall spending of the rescue operations could sum up to ₹50 lakhs to ₹1 crore and even after such attempts many lives are lost. Still the pain of families and communities can hardly be estimated; therefore, the need for protective measures is vital.

Public Safety Concerns:

One of the primary reasons for the need for laws regulating open borewells is public safety. Incidences where children have fallen into these borewells and rescues operations are always a herculean task and in most cases the child loses his/her life. Making the wells too narrow and deep it becomes very difficult to pull anybody who unknowingly falls in, and the result is they end up being killed or seriously injured.

Social outrage on borewell rescue operations:

Social outrage over borewell rescue operations stems from the public's deep frustration with recurring tragedies and systemic failures. While the intensive, high-stakes rescues capture national attention, they also expose severe negligence in preventing these accidents in the first place. Public anger is often directed at both irresponsible property owners and government authorities who fail to enforce existing safety guidelines.

The most significant cause of public anger is that these accidents, which almost always involve young children, are entirely preventable. In India, despite a 2010 Supreme Court order mandating that open borewells be properly covered and abandoned ones filled,

enforcement remains weak. Rescue forces often lack specialized equipment designed for narrow borewells, leading to improvised and time-consuming efforts.

The round-the-clock live media coverage of a trapped child's ordeal, often ending in tragedy, deeply affects public sentiment. This intense focus amplifies the heartbreak and directs public frustration toward those perceived as responsible for the failure. Inadequate policy enforcement: The fact that borewell tragedies continue despite clear Supreme Court guidelines exposes a systemic failure of state and local administrations to enforce existing laws. The public feels that authorities are derelict in their duty to protect citizens.

In the past few years, there have been many deadly incidents of children accidentally falling into Bore wells, most of which were uncovered, abandoned and illegally drilled in order to extract water in areas where groundwater is depleting. Bore well rescue operation is one of the difficult, complicated and lengthy which requires due diligences and care. Often requirement of heavy machinery is also felt. Though with great efforts NDRF and other agencies have been able to save some precious lives, but still prevention through awareness can help in preventing such incidents.

NDRF, being a specialized force in disaster response, has responded in many Borewell incidents and saved precious lives across the country. The force has also taken several initiatives to enhance its capabilities as far as Bore well incidents are concerned.

1.2 Borewells:

A borewell is a narrow, deep well drilled into the ground to access groundwater from underground aquifers. Borewells are used to extract groundwater, which is a vital water source in many regions, particularly where surface water sources are limited. A borewell involves drilling a narrow, deep hole into the earth's crust to reach the desired aquifer. A casing pipe is installed within the drilled hole to prevent it from collapsing and to maintain the integrity of the well.

Water borewells are small diameter holes dug into the ground to get to water sources that are beneath the surface of the earth. Borewells are a popular method for getting water since they were first used in the 1970s as the solution to water issues in India. India is the biggest user of ground water in the world which is drawing around 230 cubic kilometer per year. There are approximately 27 million bore wells[1] in India.

Due to water scarcity, low rainfall, drought and depletion of underground water, large number of bore wells are dug. However, when water is no longer available many borewells remain open and actually become deadly pits called "**death holes**". These open borewells are very dangerous especially to children and whenever rescue is to be

carried out, it is very expensive and most of the times futile. Reports say that since 2006, around 43 cases[2] were reported of children falling into the bore well. On an average 70% of the conventional child rescue operation fails.

India, recently has witnessed some of the most tragic but helpless incidents which touched us deeply and forced us to look after the matter seriously. The most mournful fact in that figure is that 92% of that victim is under the age of 10. The children were playing around the bore well unaware of the fact that the bore well was waiting for them in the form of a death trap. After slipping in the rotten congested pitch-black environment, they were waiting for the help to come. But the lack of oxygen and deadly atmosphere has taken their life slowly before the rescue team could reach them.

Fig. 1.1: A Borewell seen from above the ground

A submersible pump is then placed within the well to draw water to the surface. Low yielding groundwater sources are found relatively close to the surface, usually under 30 m (100 ft). These borewells are almost always private and illegal. They are dug flouting all the norms and guidelines issued by the Supreme Court of India—for water, in the face of increasing depletion of groundwater.

As there is an increasing dearth of surface water not only for drinking but also for irrigation, there has been a rise in construction of borewells. However, it is not always that a borewell dug will fetch water. Sometimes, the borewells dug several hundred feet deep will remain dry. Such borewell not fetching adequate water or no water are usually abandoned. These wells can thus become a potential death pit for those small kids who being unaware of their depth, play near these wells.

1.3 Classification of Bore well:

A. Based on Yield: Bore wells are classified according to yield as under:

1. High Capacity Bore well (HCB): Bore wells of casing pipe diameter 10 or 12 inches and depth >80m with design yield in the range of 20,000 gph to 45,000 gph.

2. Medium Capacity Bore well (MCB): Bore wells of casing pipe diameter 8 inches and depth >80m with design yield in the range of 10,000 gph to 20,000 gph.

3. Low Capacity Bore well (LCB): Bore wells of casing pipe diameter 6 inches and depth 30m to 50m with design yield in the range of 1500 gph to 5,000 gph

B. Based on Status: Bore wells are classified according to yield as under:

1. Active Borewell: An active borewell is a well that is currently functional, equipped with a pump, and used to extract groundwater for various purposes. In contrast to inactive or dried-up borewells, an active one is in operation and used for tasks like domestic water supply, irrigation, or industrial use.

2. Defunct Borewell: A defunct borewell is a well that was previously used for water extraction but is now inactive, either because it has dried up or is no longer in use. These borewells can pose safety hazards if left open

3. Abandoned Borewell: An abandoned borewell is a dangerous and often unmarked hole drilled into the ground that is no longer in use. These narrow shafts, which can be hundreds of feet deep, are intended to access groundwater for irrigation or drinking but are often left open, without any care or closing, when they run dry. They pose significant risks to humans and animals.

C. Based on Safety Condition: Bore wells are classified according to safety condition as under:

1. Capped Borewells: A capped borewell has a protective cover or plug placed over its opening, typically made of plastic, cast iron, or mild steel. This cap prevents debris and contaminants from entering the borewell and protects people and animals from falling in and are considered safe.

2. Uncapped Borewells: An uncapped borewell is an abandoned well that has not been properly sealed, creating a dangerous, hidden death trap, especially for children who may fall into them while playing. These uncapped wells pose a significant public safety risk and are a violation of local regulations, which mandate that borewells be closed by landowners and reported to authorities to prevent accidents.

D. Based on location: Bore wells are classified according to location as under:

1. Rural Borewell: A rural borewell is a deep, narrow well drilled into the ground to access subterranean groundwater, providing a vital water source for drinking, agriculture, and livestock in rural communities.

2. Urban Borewell: In urban areas, borewells are a common and often essential source of water, particularly in India, where they serve both domestic and community needs. Borewells situated at Water Treatment Plants, Urban Colonies are used for water needs of the urban residents.

3. Agriculture Borewell: Agriculture borewells are a critical water source for farming in rural as well as urban areas, particularly in regions with limited rainfall or where other water sources are scarce. These borewells cater for the water needs of agricultural crops.

4. Residential Borewell: A residential borewell is a narrow hole drilled into the ground to access a deep water source typically using a submersible pump and casing pipes to bring water to the surface for home or personal use.

1.4 Borewell related incidents in India and Abroad:

The incident of losing lives trapped in Bore well was highlighted in 2006 where a 5-years old child named Prince was rescued after a tough combat which lasted 49 hours. Another incident in Indore took place in the same year where a child name Deepak stuck in the pit hole and died for the lack of oxygen. After that, there were number of incidents happened in the various parts of the country of falling of child in a Bore well, where depth of Bore well varies from 50 feet to 700 feet.

In rural regions of the States, bore wells are widely used due to lack of water supply or unavailability of ponds, rivers etc. Almost all Government programs seek to supply water through tube wells. With the falling water level, most of these tube wells are abandoned and are usually left uncapped and open. A survey[3] sponsored by the Ministry of Water Resources in 2008 discovered that 85 percent of rural, 50 percentage of urban drinking and industrial needs, and 55 percent of irrigation needs were met through bore wells. Incidents of bore well deaths will stop only when consistent water supply where needed is ensured.

In Lok Sabha, on question of number of borewell deaths[4] between 2020 to 2025, Jal Shakti Ministry replied that as per the information received from the M/o Home Affairs, between the years 2020 and 2025, the National Disaster Relief Force (NDRF) has carried out total 37 operations in the country for borewell rescue, out of which 17 were successful.

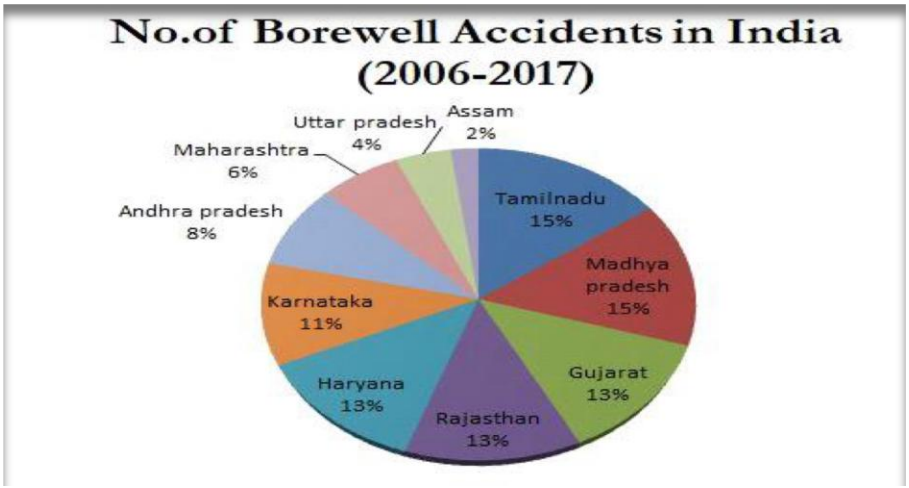


Fig. 1.2: No. of Borewell incidents in India (State-wise) for period 2006-2017

In order to propagate the safety guidelines[5] framed by the Hon'ble Supreme Court vide its Order dated 11.02.2010 and 06.08.2010, the Ministry of Jal Shakti has written multiple letters to all the Chief Secretaries/Administrators of States/UTs, to take strict action for implementation of the guidelines and also to make all the District Collectors/Magistrates responsible for effective compliance.

Further, Ministry has requested for constitution of a suitable Nodal Agency/ Department and Nodal Officer at each administrative level (from State level to Gram Panchayat level) in every state who shall be responsible for ensuring effective implementation of the directions of Hon'ble Supreme Court. So far, 12 States/UTs have responded and intimated regarding constitution of such Nodal agency in their respective state.

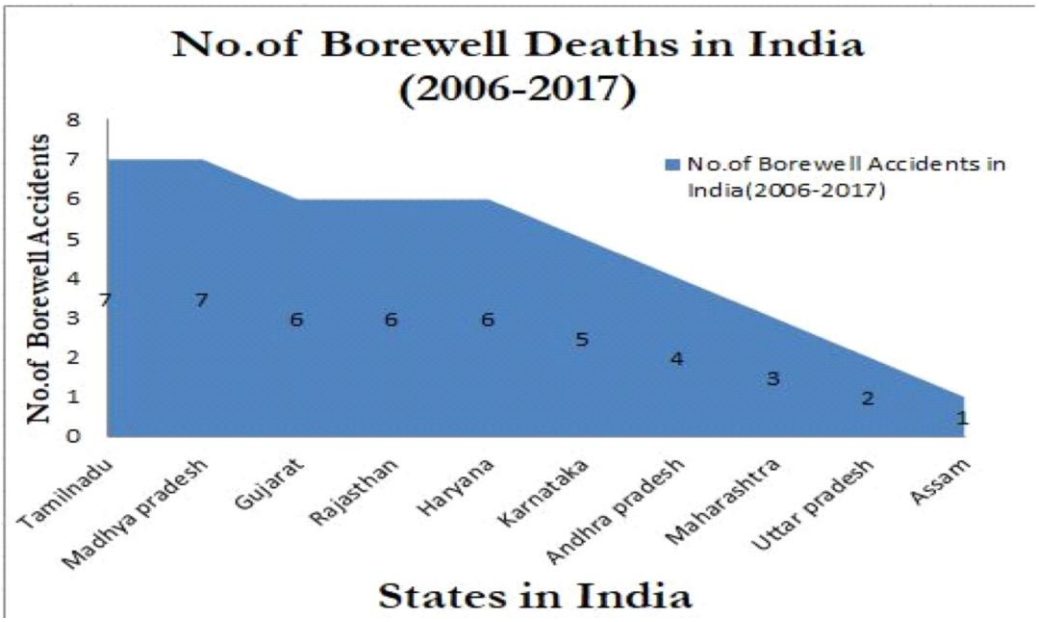


Fig 1.3: No. of Borewell death in India (State-wise) for the period 2006-2017

Borewell incidents involving children falling in are a concerning issue, not just in India, but also in other countries. While the exact statistics are difficult to pinpoint, there have been reports of similar tragedies in various regions. These incidents underscore the importance of safety measures for abandoned or disused borewells to prevent further fatalities.

Global Incidents:

While it's difficult to track specific incidents globally, reports suggest similar occurrences in areas where borewells are common, particularly in rural areas and regions with water scarcity.

Unites States of America: On October 14, 1987, while playing in house backyard, 2 years old, Jessica fell into an eight-inch-wide pipe, landing 22 feet underground. A massive team of emergency responders, drillers, and volunteers worked around the clock to reach her. Because the well was surrounded by solid rock, rescuers had to drill a parallel shaft and then a horizontal tunnel to reach the small child. For more than two days, rescuers worked tirelessly as news outlets provided live coverage. A microphone was lowered into the well, capturing Jessica movement. After 58 hours, on October 16, 1987, Jessica was pulled from the well, alive.

China: A notable borewell rescue in China occurred in May 2013 when firefighters rescued a 5-year-old boy stuck in a 15-meter deep, narrow well. The rescue involved using a mirror to reflect light to the child, allowing him to see a rope and grasp it for the successful rescue after 90 minutes of effort.

Spain: Julen García was a two-year-old Spanish boy who died after falling 109 m (358 ft) into a narrow illegally excavated shaft on January 13, 2019. The shaft was 110 m (360 ft) deep and 25 cm (9.8 in) in diameter. Rescuers drilled a parallel shaft with a wider diameter to reach the child. The operation involved over 300 people and heavy machinery. The rescue attempt attracted international media attention. After several challenges in the excavation process, Julen's body was found on January 26, 2019.

Morrocco: The case refers to the tragic death of Rayan Aourram, a five-year-old boy who was trapped in a deep, narrow well in a village in northern Morocco in February 2022. The incident and the extensive, multi-day rescue effort that followed captured global attention.

On February 1, 2022, Rayan Aourram, falls into a 32-meter (105-foot) dry well outside his home. A massive and difficult rescue operation began soon after. The well was too narrow for rescuers to enter safely. Rescue Crews used excavators to dig a large parallel

trench next to the well. The process was slowed by fear of landslides and the unstable mixture of sandy and rocky soil. Rescuers also attempted to send down oxygen, food, and water to the victim.

On February 5, 2022, after digging down, crews began the final, delicate phase of digging a horizontal tunnel by hand to reach Rayan, but they were delayed by a large rock. On February 6, Rescuers finally break through to Rayan and pull him out of the well. By that time, the victim 'Rayan' has died.

Africa: Borewells are used extensively in African countries for water access, and there have been reported incidents of children falling into them, especially in areas with limited oversight or safety measures for abandoned wells.

Middle East: Similar to India, borewell usage is prevalent in some Middle Eastern countries, and reports of children falling into them have also surfaced.

South America: Some regions in South America also utilize borewells for water, and there are concerns regarding the safety of abandoned or unmaintained wells, potentially leading to incidents.

1.5 Main Causes of Bore well Accidents:

Borewell accidents, particularly those involving children, are often caused by a combination of factors including uncovered or improperly sealed borewells, lack of awareness, insufficient safety regulations, and inadequate warning signs. Poor borewell construction and delayed response times from rescue agencies also contribute to the problem

1. **Uncovered or Abandoned Borewells**: Many borewells, after drying up, are left open without proper sealing, posing significant hazards. Most of the times the borewells are successfully dug, however sometimes the borewell doesn't fetch enough water. Such borewells are then abandoned by its owners without taking proper measures to seal it.

2. **Lack of Awareness and Supervision:** Children playing near agricultural fields may inadvertently fall into uncovered borewells due to insufficient supervision and awareness.

3. **Non-compliance with Safety Regulations**: Despite guidelines from Supreme Court of India and states authorities, there is often a lack of adherence to safety measures during borewell drilling and after their abandonment.

4. **Inadequate Warning Signage**: The absence of clear warning signs around borewell sites increases the risk of accidental falls.

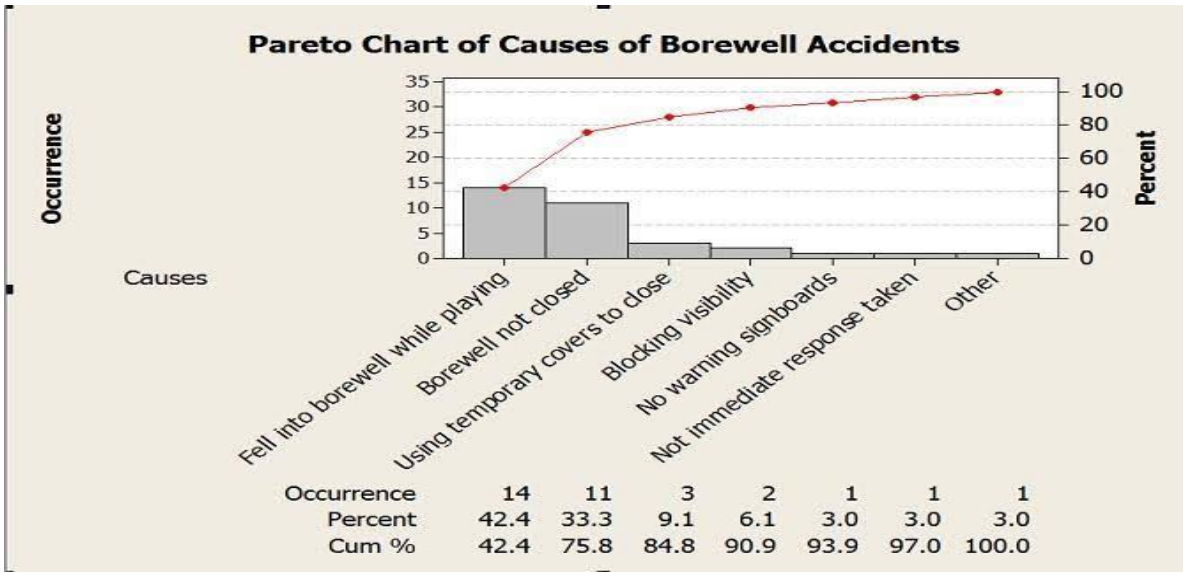


Fig 1.4: Pareto Chart showing percentage of causes of borewell incidents

5. **Improper Borewell Construction**: Substandard construction practices, such as insufficient casing and lack of protective barriers, contribute to the danger posed by borewells.

6. **Curiosity and Playfulness**: Young children are naturally curious and may wander near these wells, sometimes falling in while playing. This can be due to the fact that small children are usually unaware of their surroundings and are more dependable on their parents or guardians for their safety. Similarly, these children have very curious nature to explore things which can become dangerous if not done under supervision. Again, while playing they might be totally unaware about the danger of such abandoned borewells, as from surface they seem to be quite harmless.

7. **Lack of Awareness**: There is often a lack of awareness among parents and communities about the dangers posed by open borewells, leading to insufficient precautions.

8. **Flimsy covering of borewell**: Sometimes, dry and unused borewells are covered with flimsy or temporary coverings like cardboard, wooden ply board etc, which can be easily removed by children leading to incident.

1.6 Lack of Regulatory Framework:

Water being a state subject, the responsibility of effective regulation of ground water extraction and associated activities like drilling of borewells and their maintenance, is primarily the responsibility of the state governments. The Central Government largely plays an advisory role and extends necessary guidance to the states as and when

required. The M/o Jal Shakti had circulated a 'Model Bill[6] to Regulate and Control the Development and Management of Ground Water' in the year 2005, to all the States/UTs to enable them to enact suitable ground water legislation for regulation of its development.

The Bill included the provisions like Grant of permit for sinking a new borewell; Registration of existing borewell-owners; Registration of Drilling Agencies; Restrictions of the depth and diameter of bore wells; Restriction on purpose of use of ground water etc. which are meant for effective compliance management on the part of borewell drillers as well as owners leading to prevention of unfortunate borewell accidents.

So far, 21 States/UTs have adopted and implemented the ground water legislation, Karnataka being one of them. Additionally, the Guidelines by CGWA for ground water regulation also prescribe that it shall be the responsibility of State / UT Governments for registering drilling rigs operating within their jurisdiction and for maintaining the database of wells drilled by them. Going further ahead, CGWA Guidelines impose a mandatory condition on the projects seeking NOC for ground water extraction, that in case of failure of well, such defunct well shall be properly sealed and documentary proof in this regard shall be submitted.

1.7 Injuries and casualties from borewell incident:

Frequent incidents of children falling into open borewells across the country reveal serious lapses in enforcing the Supreme Court's 2010 guidelines aimed at preventing such tragedies. Most recently on December 23, 2024, a three-year-old girl, Chetna, fell into a 700-foot-deep borewell outside her house in Rajasthan's Kotputli-Behror district. Earlier, on December 9, Aryan, a five-year-old boy, fell into a 150-foot borewell in Rajasthan's Dausa. Despite a grueling 55-hour rescue effort, he was declared dead on arrival at the hospital.

Other incidents in 2024 include

a) November 20, Barmer, Rajasthan: A four-year-old boy died after falling into a 160-foot borewell. He drowned in water present at 100 feet, despite a six-hour rescue effort.

b) September 19, Dausa, Rajasthan: A two-year-old girl was successfully rescued after being trapped in a 35-foot borewell for 18 hours.

c) July 29, Singrauli, Madhya Pradesh: A three-year-old girl, Shoumya, fell into a 25-foot Borewell and was rescued after five and a half hours, but later died in the hospital.

d) June 15, Amreli, Gujarat: A toddler fell into a 45–50-foot borewell. Despite a 15-hour operation, the child was declared dead after being rescued.

e) May 28, Alwar, Rajasthan: A five-year-old boy fell into a 40-foot borewell in

Laxmangarh, but was rescued safely after three hours.

f) April 12, Rewa, Madhya Pradesh: A six-year-old boy died after being trapped for 45 hours in an open borewell in Manika village.

g) April 4, Vijayapura, Karnataka: A two-year-old boy was rescued after being trapped for 20 hours in a borewell outside his house.

h) January 2, Devbhumi Dwarka, Gujarat: A two-and-a-half-year-old girl, Angel Sakhra, died in a hospital after an eight-hour rescue operation from a 30-foot borewell.

1.8 Requirements for Borewell Rescue:

The urgent need for effective rescue operations in the context of borewell accidents, where innocent lives, especially children, are at risk. These bore-wells are trapping a lot of innocent children, who are dying as a result. While bore- wells are intended to save lives, they have instead started to take a great number of innocent lives. Several times, large machines and a lot of human labour are used in the rescue efforts. These rescue operations are typically very drawn-out, difficult, and time - consuming processes. Conventional rescue methods involving excavation are slow, labour intensive, and hazardous.

Fig 1.5 Rescuers planning to rescue the victim from an open borewell

Community Level Response for Borewell Rescue:

In any disaster, local community is the first responder. Community level preparedness is very crucial to prevent, mitigate and respond in such incidents. and Community-level preparedness for borewell rescue focuses on prevention, rapid response, and community involvement to save lives. While specialized rescue operations are conducted by trained professionals, local communities are often the first responders. Their immediate actions can significantly increase the chances of a successful rescue

Preventive action by the community:

- **Identify and report hazards:** Community members, including village heads (Sarpanches) and agricultural officials in rural areas, should regularly identify and report open, defunct, or unsecured borewells to the district administration.
- **Mandatory borewell sealing:** Owners must properly seal abandoned borewells with materials like clay, sand, and boulders up to ground level. This prevents them from becoming hidden death traps. In some regions, like Karnataka, specific laws penalize non-compliance with fines and imprisonment.
- **Secure new borewells:** During construction, ensure new or operational borewells are properly secured.
- **Public awareness campaigns:** Educate the community, especially children and parents, about the dangers of open borewells. School programs and village meetings can spread awareness about safety measures and the importance of reporting unsecured sites.

Emergency response protocols: A swift and coordinated community response is crucial during the initial stages of an incident.

- **Establish a communication network**: Create a clear chain of command and communication system. This can involve setting up a community-wide alert system using phone trees, SMS alerts, or a central contact point for emergencies.
- **Designate first responders**: Train a local group of volunteers in basic first-aid and how to safely secure the immediate area around the borewell. Their role is to provide initial support while professional teams are en route.
- Provide initial aid:
    - **Secure the area**: Immediately cordon off the borewell using any available materials to prevent other people from falling in.
    - **Alert authorities**: Immediately contact the local administration, police, fire department, and disaster response teams like the National Disaster Response Force (NDRF).
    - **Provide oxygen**: Lower a pipe or hose into the borewell to supply oxygen to the trapped victim. Community members can use simple equipment to maintain an air supply.

  - **Use visual aids**: Lower a light source or a basic camera (like a smartphone) on a rope to assess the victim's location and condition.

- **Gather information for rescuers**: While waiting for help, gather critical information for the professional rescue team, including:
  - Incident details (time, exact location).
  - Approximate depth and diameter of the borewell.
  - Nature of the surrounding soil (rocky, sandy, etc.).
  - The victim's age and approximate depth.
- **Assist rescue teams**: Once professional teams arrive, the community's role shifts to providing support. This includes:
  - Controlling the crowd and managing onlookers.
  - Mobilizing local resources, such as heavy machinery (JCBs) for parallel digging, lighting facilities, and shoring materials if needed.
  - Assisting with the establishment of a safe rescue site.
- **Sustain rescue efforts**: Offer logistical support to rescue teams, such as providing food, water, and shelter during prolonged operations.

Post-rescue Care:

- **Immediate care**: Provide immediate post-rescue medical care, including arranging transport to a hospital.
- **Follow-up support**: Ensure the victim and family receive ongoing support, including medical care and counselling.
- **Proper closure**: After the rescue operation, confirm with authorities that the borewell is completely and permanently sealed to prevent future incidents.

A successful borewell rescue operation requires a combination of swift action, Specialized equipment, and effective coordination. Key requirements include:

1. **Immediate Response and Assessment**:

- **Rapid notification:** The situation needs to be reported immediately to emergency services and local authorities by the first responders, villagers, police etc.
- **Initial assessment:** Information about the borewell's depth, diameter, and the victim's location needs to be gathered quickly and shared with rescue agencies like NDRF, SDRF and Fire Services
- **Safety protocols:** Ensuring the safety of rescue personnel is paramount.

2. Specialized Equipment and Tools:

- **Borewell rescue devices:**
  These devices, often robotic or remotely operated, kike iron hooks, rods, L hooks, robotic arm grippers and rescue camera are designed to navigate the borewell, assess the situation, and retrieve the victim.
- **Communication equipment:**
  Cameras and sensors like two-way communication system and thermal cameras allow real-time monitoring of the victim's condition and the borewell environment.
- **Safety gear:**
  Rescue personnel require appropriate protective clothing, mittens, harnesses, and communication devices.

3. Skilled Personnel and Coordination:

- **Training and experience:** Rescuers need specialized training in borewell rescue operations.
- **Teamwork:** Effective communication and coordination are crucial among rescue personnel and with medical teams.
- **Medical support:** A medical team must be available to assess the victim's condition and provide necessary care.

4. Environmental Conditions:

- **Oxygen levels:** The borewell's oxygen levels need to be monitored and supplemented if necessary.
- **Temperature and humidity:** These factors can affect the victim's condition and the Effectiveness of rescue efforts.
- **Potential hazards:** Identifying and mitigating risks such as cave-ins or toxic gases is vital.

5. Planning and Strategy:

- **Pre-emptive measures:** Planning for potential rescue scenarios can help streamline the response process.
- **Alternative strategies:** Having backup plans in case the primary rescue method fails is crucial.
- **Adaptability:** The rescue plan needs to be flexible and adaptable to the evolving situation

****

Lesson No. 02

Legal Aspect of Borewell & Media management:

Objectives:

2.1 Supreme Court Guidelines on Borewell

2.2 State's compliance and enforcement gaps

2.3 Legal liability in borewell incident case

2.4 SOP issued by NDRF HQs

2.5 Media Sensationalism during Borewell Rescue

2.6 Effective Media Management in Borewell Rescue

Fig 2.1 Supreme court suo moto issued borewell safety guidelines in 2010

Borewell accidents show that the 2010 Supreme Court of India safety guidelines are not being followed properly. The court took Suo-moto action after many cases of children falling into open borewells. Even with clear rules, these incidents still happen, causing dangerous situations and rescue operations. There is an urgent need to enforce these safety measures more strictly to stop such accidents. These tragedies occurred despite comprehensive guidelines issued by the Supreme Court on February 11, 2010, in response to a letter petition highlighting the alarming frequency of such accidents.

2.1 Guidelines[7] regarding borewell safety measures by Supreme Court:

Safety measures/guidelines as given in the Order dated 11.02.2010 of Hon'ble Supreme Court is to be observed by all the States: -

- ✓ The owner of the land/premises, before taking any steps for construction bore

well/tube well must inform in writing at least 15 days in advance to the concerned authorities in the area, i.e., District Collector/District Magistrate/Sarpanch of the Gram Panchayat/ Concerned officers of the Department of Ground Water/ Public Health/Municipal Corporation, as the case may be, about the construction of bore well/tube well.

- ✓ Registration of all the drilling agencies, viz., Govt./Semi Govt./Private etc. should be mandatory with the district administration.
- ✓ Erection of signboard at the time of construction near the well with the following details:-(a) Complete address of the drilling agency at the time of construction/ rehabilitation of well. (b) Complete address of the user agency/owner of the well.
- ✓ Erection of barbed wire fencing or any other suitable barrier around the well during construction.
- ✓ Construction of cement/concrete platform measuring 0.50x0.50x0.60 meter (0.30 meter above ground level and 0.30 meter below ground level) around the well casing.
- ✓ Capping of well assembly by welding steel plate or by providing a strong cap to be fixed to the casing pipe with bolts and nuts.
- ✓ In case of pump repair, the tube well should not be left uncovered.
- ✓ Filling of mud pits and channels after completion of works.
- ✓ Filling up abandoned Borewells by clay/sand/boulders/pebbles/drill cuttings etc. from bottom to ground level.
- ✓ On completion of the drilling operations at a particular location, the ground conditions are to be restored as before the start of drilling.
- ✓ District Collector should be empowered to verify that the above guidelines are being followed and proper monitoring check about the status of boreholes/tube-wells are being taken care through the concerned State/Central Government agencies.
- ✓ District/Block/Village wise status of bore wells/tube-wells drilled viz. No. of wells in use, No. of abandoned bore wells/tube wells found open, No. of abandoned Bore wells/ tube wells properly filled up to ground level and balance number of abandoned Bore wells/tube-wells to be filled up to ground level is to be maintained at District Level. In rural areas, the monitoring of the above is to be done through village Sarpanch and the Executive from the Agriculture Department.
- ✓ If a Bore well/tube-well is 'Abandoned' at any stage, a certificate from the concerned, department of Ground Water/Public health/Municipal Corporation/Private contractor etc. must be obtained by the aforesaid agencies that the 'Abandoned' Bore well/tubewell is properly filled up-to the ground level. Random inspection of the abandoned wells is also to be done by the Executive of

the concern agency/department. Information on all such data on the above are to be maintained in the District Collector/Block Development Office of the State.

2.2 States' compliance and enforcement gaps:

Despite clear directives, compliance with the 2010 guidelines has been inconsistent across India. The lack of strict enforcement is evident in the recurring incidents of children falling into open borewells.

- **Weak enforcement**: Legal experts and news reports highlight that the enforcement of the court's orders remains weak, leading to preventable tragedies.
- **Official responsibility**: While the Supreme Court placed monitoring and execution responsibilities with local authorities, the actual implementation has often fallen short.
- **Persistent issues**: Accidents continue to occur in various states, demonstrating significant gaps in enforcement and public awareness.
- **Central government advisories**: The Central government has repeatedly advised states and union territories to strictly implement the Supreme Court's guidelines. The Ministry of Jal Shakti has also established the Central Ground Water Authority (CGWA) to regulate groundwater management in many states.
- **Recent reminders**: Continuing incidents have prompted a renewed focus on the 2010 guidelines. In response to a recent borewell tragedy in Rajasthan, for example, the National Disaster Response Force (NDRF) and State Disaster Response Force (SDRF) were involved, once again highlighting the lapses in following the standing orders

In order to propagate the safety guidelines framed by the Hon'ble Supreme Court, the Ministry of Jal Shakti has written multiple letters to all the Chief Secretaries/Administrators of States/UTs, to take strict action for implementation of the guidelines and also to make all the District Collectors/Magistrates responsible for effective compliance. Further Ministry has requested for constitution of a suitable Nodal Agency/ Department and Nodal Officer at each administrative level (from State level to Gram Panchayat level) in every state who shall be responsible for ensuring effective implementation of the directions of Hon'ble Supreme Court. **So far, 12 States/UTs** have responded and intimated regarding constitution of such Nodal agency in their respective state.\

The M/o Jal Shakti had also circulated a 'Model Bill to Regulate and Control the Development and Management of Ground Water' in the year 2005, to all the States/UTs to enable them to enact suitable ground water legislation for regulation of its development. The Bill included the provisions like Grant of permit for sinking a new borewell; Registration of existing borewell-owners; Registration of Drilling Agencies;

Restrictions of the depth and diameter of bore wells; Restriction on purpose of use of ground water etc. which are meant for effective compliance management on the part of borewell drillers as well as owners leading to prevention of unfortunate borewell accidents. So far, **21 States/UTs have adopted and implemented the ground water legislation**, Karnataka being one of them**.**

2.3 Legal liability in borewell incident case

In borewell rescue cases in India, legal liability falls primarily on the borewell owner, drilling agency, and local authorities for negligence in following safety guidelines. The Supreme Court of India issued detailed, mandatory guidelines in 2010 to prevent such incidents, but repeated tragedies indicate significant failures in enforcement.

Liability of the borewell owner:

The landowner or owner of the borewell is typically held primarily responsible if a borewell is left open or improperly sealed. Their liability stems from negligence and includes:

- **Negligent conduct**: Failing to properly fence, cover, or fill an abandoned or non-operational borewell is a direct act of negligence. This can lead to charges under Section 106 of the Bharatiya Nyay Sanhita (BNS), causing death by negligence.
- **Non-compliance with Supreme Court guidelines**: The owner is obligated to follow the 2010 Supreme Court guidelines, which require:
    - Fencing borewells during and after construction.
    - Notifying local authorities at least 15 days before drilling.
    - Securing borewells with a steel plate cover fixed with bolts.
    - Filling abandoned borewells with material from the bottom to ground level.
- **Penalties**: State-specific laws, such as those in Karnataka, can impose imprisonment and heavy fines for non-compliance.

Liability of the drilling agency:

The agency hired to drill the borewell also has legal obligations and can face liability for negligence.

- **Failure to notify**: Drilling agencies are required to register with the district administration and inform them of new borewell projects.
- **Inadequate safety measures**: The agency can be held responsible if it fails to ensure proper sealing or fencing after completing a project.
- **Penalties**: State laws may also impose specific penalties on drilling agencies for violations.

Liability of government and Local Authorities:

The Supreme Court has emphasized the government's role in enforcing safety guidelines, and authorities have been held accountable for negligence.

- **Dereliction of duty**: The National Human Rights Commission (NHRC) has issued notices to state governments, citing "apparent negligence" and "dereliction of duty" when guidelines are not followed.
- **Failure to monitor and enforce**: The Supreme Court guidelines require local officials, including village sarpanches and district collectors, to monitor borewells and enforce safety norms. Failure to do so can result in legal action.
- **Public interest litigation (PIL)**: In the wake of tragedies, PILs have been filed in the Supreme Court against the central and state governments for their inaction in preventing borewell deaths.
- **Action against negligent officials**: Courts have indicated that officials responsible for monitoring could be prosecuted under Section 106 of the Bharatiya Nyay Sanhita (BNS) for negligence.

Other Legal aspects:

- **Right to life**: The judiciary and human rights bodies view negligence in borewell cases as a violation of the victim's right to life under Article 21 of the Constitution.
- **Rescue operation liability**: While rescue agencies like the NDRF and SDRF are generally protected, negligence during an operation can potentially attract scrutiny. In some cases, families have criticized delays and poorly conceived efforts that may have worsened a child's condition.
- **Parental negligence**: While the primary liability falls on the borewell owner and authorities, some borewell cases have raised questions about parental supervision. However, the legal focus has overwhelmingly remained on the systemic failures to secure dangerous borewells

2.4 SOP issued by NDRF HQ:

NDRF, being a specialized force in disaster response, has responded in many Borewell incidents and saved precious lives across the country. The force has also taken several initiatives to enhance its capabilities as far as Bore well incidents are concerned. The compilation of “SOP on Borewell Incident Response” is based on the lessons learnt by NDRF and other stakeholders during past incident. SOP on Bore well rescue is helpful not only to NDRF rescuers but other stakeholders as well. It guides all the stakeholders to adopt a certain level of uniformity in response.

The SOP[8] is aimed to lay down guidelines for NDRF Bns for responding to borewell emergencies. The purpose of the SOP is to establish the procedure for the response of the SAR team(s) of the Bns of NDRF in the States/UTs for bore well incident. The SOP

prescribes guidelines and assigns responsibility for adopting various executive actions to ensure prompt response during incident.

This SOP shall be used to formulate NDRF action plans and procedures for launching specialized Rescue response which should be instrumental in saving precious lives. The objective of this SOP is to establish operating procedures for addressing all aspects of managing during bore well incident.

These are as follow:

a) Guidelines for troops for rescue operation during the bore well incident.
b) Achievement of best result through well planned rescue operations.
c) Reducing reaction time of the teams in responding to such incidents.
d) Coordinating and collaborative instructions during bore well incident

The SOP applies to all elements of the Command while performing bore well incident response operations. The role and responsibilities of the rescuers and supervisors are clearly defined along with procedure of making requisition for services of NDRF. According to SOP, the execution of Borewell operation is divided in five phases:

i. Preparedness Phase
ii. Activation and Mobilization Phase
iii. Operation Phase
iv. Deactivation and Demobilization phase
v. Post Operation Phase

The borewell SOP briefly discuss about challenges in borewell rescue operations and rescue methodologies used by rescue teams. The SOP outlines check list of items which shall be carried by the team while responding for a borewell operation. The SOP has been prepared with the objective that all the required and approved procedures are followed in the rescue operations and all the processes and activities continue uninterruptedly and simultaneously so that the entire tasks are completed in prescribed schedule. The SOP also aims at fixation of accountability at all the stages.

2.5 Media Sensationalism during Borewell Rescue:

Media sensationalism in borewell rescues is a critique of how news outlets sometimes exploit these incidents for dramatic effect, focusing on emotional appeals, graphic details, and the involvement of vulnerable victims (often children) to increase viewership or readership rather than providing factual, constructive reporting. This approach can lead to the exploitation of tragedies, potentially interfering with rescue efforts and neglecting the technical and human aspects of the rescue, while also distorting public understanding of the actual rescue process.

Media Coverage sensationalise the borewell rescue cases by:

- **Emotional Exploitation**: News may focus heavily on the child's plight, parental grief, and the helplessness of rescuers to evoke strong emotional responses from the audience.
- **Graphic Details**: Reports might include vivid descriptions of the child's condition or the difficult, dangerous environment, which can be distressing and unnecessary for reporting.
- **Focus on the Spectacle**: Rather than detailing the engineering or logistical challenges, the media may highlight the visual drama of the rescue itself, turning it into a public spectacle.
- **Simplistic Narratives**: Complex technical solutions or the collaborative efforts of many teams might be glossed over in favour of a simplified narrative of a heroic struggle.
- **Repetitive Framing**: Stories are often framed in a recurring pattern of peril, despair, and eventual (or failed) rescue, creating a formulaic and predictable, yet dramatic, presentation.

Negative Impacts of Media Sensationalism

- **Hindrance to Rescue Efforts**: Intense media presence can create access issues and distractions for the actual rescue teams working on the ground.
- **Ethical Concerns**: It raises questions about the invasion of privacy, especially for the trapped child and their family, during a highly stressful and vulnerable time.
- **Misinformation**: Overly emotional or simplified accounts can obscure the technical realities and the often-slow, methodical nature of these complex rescues, leading to public misunderstanding.
- **Desensitization**: Constant exposure to sensationalized accounts of similar incidents can, ironically, lead to public desensitization to the tragedy of each individual case.
- **Pressure on Rescuers**: The intense public scrutiny fueled by sensational media coverage can place undue pressure on rescuers, diverting focus from critical tasks.

4.6 Effective Media Management in Borewell Rescue:

Effective media management is crucial during borewell rescue operations for several reasons. It helps in coordinating rescue efforts, providing timely information to the public, and fostering a sense of community trust. By managing media access and

disseminating accurate information, authorities can ensure the safety and well-being of the rescued individual and maintain order at the rescue site.

Fig 2.2 A snippet from digital media during an ongoing borewell rescue operation

Media management in a borewell rescue focuses on strategic communication to inform the public, manage public perception, and prevent mis-information, control sensationalism while ensuring it doesn't impede rescue operations. Key aspects include designating a single spokesperson, providing regular, consistent updates, using multiple platforms for communication, and establishing a controlled media access area to facilitate the operation and maintain the safety of all involved. The goal is to balance the public's right to information with the need for effective, uninterrupted rescue efforts.

Media sensationalism in borewell rescues is a critique of how news outlets sometimes exploit these incidents for dramatic effect, focusing on emotional appeals, graphic details, and the involvement of vulnerable victims (often children) to increase viewership or readership rather than providing factual, constructive reporting. This approach can lead to the exploitation of tragedies, potentially interfering with rescue efforts and neglecting the technical and human aspects of the rescue, while also distorting public understanding of the actual rescue process

Key Aspects of Media Management

- Appoint a single, trained spokesperson to ensure consistent and accurate information is released to the media.
- Establish a designated media centre or information point away from the immediate rescue site to control access and minimize interference.

- Provide frequent updates to the media and public to manage expectations and prevent rumours.
- Be open about the rescue efforts, challenges, and progress to build public trust and reduce speculation.
- Strictly control who can access the site and when to ensure the safety of media personnel and, most importantly, to avoid disrupting rescue work.
- Utilize social media and official websites to broadcast real-time information and official statements, supplementing traditional media coverage.
- Recognize the emotional nature of such incidents and communicate with empathy, especially when dealing with the families of the victims.
- The primary focus must always remain on the rescue effort. Media activities should not hinder or delay operations.
- Before releasing any information, ensure it is verified and accurate.
- Have a pre-defined crisis communication plan for such incidents to ensure an efficient and coordinated response.

Post-Rescue

- **Debriefing:** Provide comprehensive information to the media about the outcomes of the operation, including any lessons learned.
- **Evidence and Follow-up**: Depending on the situation, be prepared to provide further information or engage in follow-up stories to ensure comprehensive reporting and public education on borewell safety.

****

Lesson No. 03

Operational Requirement of Borewell Rescue:

Objectives:

3.1 Challenges faced in borewell rescue operations

3.2 Borewell Rescue equipment.

3.3 Supportive borewell rescue equipment.

3.4 Technical borewell rescue equipment.

3.1 Challenges faced by rescue teams in bore well rescue operations:

It becomes very important for the authorities and the personnel involved in digging the borewell to adopt various preventive measures during and after the successful or unsuccessful digging of the borewell. Prevention is the best method to avoid such incidents rather than to counter various rescue measures afterwards. Several methods had been adopted till now for rescuing the ill-fated victims. Digging a parallel bore hole, catching the victim from above the bore well, etc. New methods have been proposed like bore well rescue robots with advanced equipment and devices, robotic modules with arms and camera systems etc. However, any method used should not only be fast and easy but also safeguard the wellbeing of little victims who are already in an endangered state.

Rapid action and swift recovery of the trapped child must be done by any of the above-mentioned rescue methods. However, methods must be used which are best suited to that particular geography. Proper ventilation measures in form of oxygen cylinders and removal of harmful gases or water must be simultaneously carried out during the rescue operations. Whether or not the victim is still alive within a borewell can be ascertained by using the help of fiber optic cable cameras.

Personnel must be trained in such particular rescue operations along with medical and paramedical facilities. Proper cordoning-off the surroundings from bystanders and strangers must be done to prevent chaos during rescue operations. Rescue operations must be supplemented by police and other law and order restoring agencies. Similarly, strict laws or legislations must be adopted to curb such untoward incidences where the children get fatally trapped. Preventive measures are better than the actual exercise of the rescue. During previous rescue operations done by NDRF, rescuers had to face multitudes of problems, which are very important for all rescuers to take a lesson from. Some of the problem faced by the rescuers that complicated the operation are as under:

1. **Tender and small age of victims** - Most of the borewell incident cases, the age of the victim is between 0-12 years. As children are heavily dependent on their parents for safety and well-being, children playing while their parents are working in the field becomes victim in open borewells. On analysing borewell cases for a period over 10 years from 2006-2016, it is observed that 43 children under age 0-12 years became the victim of open borewell[9]. Though adults are also becoming the victim of borewell but most of the time, it is toddlers or children only.

Fig 3.1 A child victim stuck in a borewell.

The biggest challenge with tender and small age of children during borewell rescue operation is that they are too small to follow instruction and too tender to bear rigorous extraction process. In one bizarre case, 2 days old new born baby girl was dumped in a 20-foot deep abandoned borewell in Rengali block of Sambalpur, Orrisa. The incident came to light at after villagers heard cries of the baby from inside the pit.

Age (years)	Sex	
	Male (%)	Female (%)
0 – 2	08 (29.6)	04 (25)
2 – 4	07 (25.9)	08 (50)
4 – 6	06 (22.2)	03 (18.8)
6 – 8	02 (7.4)	01 (6.2)
8 – 10	02 (7.4)	00
10 – 12	02 (7.4)	00
>12	01(3.7)	00
Total	**27 (100)**	**16 (100)**

Fig 3.2: Age and Sex was distribution[10] of cases of fall in borewell for the period 2006-2016

On being informed, NDRF, ODRAF and fire services personnel rushed to the spot and launched a rescue operation. Oxygen was supplied into the pit for the baby and the area near the bore-well was dug with the help of excavators. Later, the rescue personnel resorted to manual digging to reach the trapped baby. After a marathon operation by lasting eight hours newborn baby girl stuck inside a 20-foot-deep abandoned bore-well was rescued. It was a simple 100-watt light bulb that provided much-needed heat to a newborn girl who was found stuck inside a cold bore well. Getting response from infants and children of tender age makes the whole rescue process difficult.

2. **Remoteness of bore well incident locations** - Some location of borewell incident is so remote that providing necessary rescue infrastructure at such remote location is in itself a herculean task and time consuming, which in turn hampers the early rescue of the victim. In many borewell cases, rescue teams had to wait for reaching of heavy equipment from urban centres; losing precious operation time.

3. **Lack of supportive rescue infrastructure** - Every borewell operation is unique in itself and poses new challenges. There is no standard method or equipment to extricate the victim from borewell. All the tools and equipment used by rescue agencies are fabricated as per requirement. Though research or making robotic tools in going on but as of now it hasn't resulted in any concrete solution for such incidents. In addition, when an incident happens in such remote locations, major infrastructure like Drilling Rig machines and Excavators need to be called from urban centres and such heavy machinery find it difficult to reach on such remote locations. Borewell operation are primarily a race against time, where probability of live rescue plummets after every passing hour.

4. **Confined space** - Borewells present a confined space hazard, making rescue operations challenging. The narrow, vertical space, potential for collapse, and limited access make it difficult to reach and safely retrieve individuals trapped inside. Confined spaces, like those found in borewells, pose significant challenges to rescue operations due to their limited access, potential hazards, and the need for specialised equipment and training. These constraints can hinder efforts to safely retrieve individuals trapped in such environments.

Borewells are often deep, narrow shafts, making it difficult for rescuers to reach the victim and bring them to safety. Borewells can contain hazardous materials, like poisonous gases or chemicals, and may have limited oxygen, posing risks to both the victim and the rescuers. Rescue operations in borewells require specialized equipment, such as tripods, winches, and harnesses, and trained personnel skilled in confined space rescue techniques. The confined space and potential hazards create a limited window of time for rescue, as the victim's oxygen supply may be compromised. In essence, the combination of physical limitations, potential hazards, and the need for specialized resources make confined space rescues, including those involving borewells, a challenging and potentially dangerous undertaking. The rescue team has to use light, camera, oxygen pipe, and rope in such confined borewell space, which leave very less room for maneuvering and hence

Fig 3.3: NDRF rescue teams working in a confined space in a Borewell Ops in Kotputli Rajasthan.

complicate the whole operation. In addition to the borewell being confined, there had been instances where the incident location is so confined that rescue teams could not use heavy equipment to its full use and has to resort to manual hand equipment, resultantly delaying the operation and jeopardizing life of the victim.

In one such operation[11] in Farrukhabad, Uttar Pradesh in April 2019, where a six-year-old victim Seema was trapped at 60-foot depth of Borewell. On several occasion, the mound of soft soil and sand collapsed on the tunnel dug by rescue team, which further pushed the girl deep into the borewell. At one time, two rescuers were also got injured when they were trapped under the mound of loose soil. Further, the incident site was so confined that the neighboring houses near the borewell had developed minor cracks and triggering a fear of collapse.

After an intensive analysis of the site by Army Engineers, District administration and Rescuers, it was unanimously decided to let the family and gram panchayat decide if the rescue needs to be continued or stopped. After the family's and Gram Panchayat consent, it was decided to call off the operation for the larger interest of the villager's life and property safety. It was one such heart wrenching operation where body of the victim could not be recovered due to fear of nearby structure failure and collateral damage.

5. **Poor Visibility** - Poor visibility poses a significant challenge in borewell rescue operations, particularly when children are trapped. The confined, narrow, and often deep borewells, along with the lack of natural light, make it difficult for rescuers to see and assess the situation, as well as the child's condition and location. Borewells are underground structures, meaning there is no natural light. This darkness, combined with potential dust and debris, creates a situation with extremely low visibility, making it difficult to locate the child and assess the situation.

Fig 3.4 Poor visibility in borewells is a challenge for rescuers in operation

It becomes challenging to determine the child's location within the borewell, making it difficult to plan the rescue operation and ensure a safe extraction. Rescue teams often use torches along with infrared cameras to access the victim situation. Still, sometimes, the whole environment becomes so complex that rescuers are not able to make any informed decision due to poor visibility inside the borewell. In such an operation in December 2024 in Kotputli, Rajasthan, where a 3-year-old girl Chetna got trapped in borewell, the rescue operation at night was hampered due to fogging of camera lens inside the borewell. Such low visibility hampers the pace of the already critical operation.

6. **Law and order issues** - Every borewell operation pose different types of challenges. The rescue team has to make a rescue plan as per availability of resources at the ground. Borewell operations are very delicate and time consuming as there is no single proven strategy that can work all time. In the Chetna borewell case, Kotputli, law and order were involved in multiple ways. Initially, the rescue operation was overseen by a joint team including the NDRF, SDRF, District Collector, and Police. Initially, rescuers tried to extricate the victim using conventional methods. When conventional methods did not work as expected, Pilling machine and Excavators were summoned at incident site. Such large and expensive resources take time to get arranged.

While the rescue was ongoing, there were accusations of negligence and delays, particularly regarding the initial rescue attempts. Family and villagers accused the administration of negligence in the initial stages of the rescue.

7. **Operation against time** - Every borewell operations is an operation against time. As the time passes the chances of survival of victims keeps fading. Data from previous borewell operation suggests that initial 6 hours are very crucial for survival of the victim. There have been instances where victims are extricated alive within 48-72 hours but these are only few. Most of the victims won't survive beyond 72 hours. The event of rescuing the victim as early as possible is of paramount importance.

Kotputli Borewell News: कोटपूतली में बोरवेल में फंसी चेतना (3) को 170 फीट गहराई से दस दिन बाद बाहर निकाल लिया गया है। हालांकि बच्ची की जान नहीं बच पाई। जिला प्रशासन की टीम ने बोरवेल के समानांतर एक सुरंग खोदकर बच्ची को बाहर निकाला।

Fig 3.5: A newspaper Cutting showing a borewell rescue operation that lasted for 10 days.

In a research paper "Fatal Accidents of Children Falling into Abandoned Borewells: An 11-Year Review of Data and Literature" it was found that most of the victims that survived were rescued within 6 to 12 hours after the fall. However, there were cases where the victim was not able to be rescued for a period as long as 72 hours or more. Rescuing the victim from such borewells is a cumbersome and tedious job. The rescuer not only has to think of rescuing, but also the safety and wellbeing of the victim during such operations. The pattern of borewell, its ground soil structure and its internal environment has to be taken into account while doing the rescue operation.

Similarly, the method of rescue apparatus used, had to be carefully planned. Planning such an operation is very important before commencing it. Such incidences are mostly not, so it requires sufficient time to prepare for rescue operations.

When the period of rescue was correlated with survival, it was observed that most of the cases who survived were rescued within 6 hours or less after the fall. Thus, as the time of rescue increases, the chances of survival decreases.

Some borewell rescue operations are so complex that it runs for days. In one borewell rescue operation in Feb 2024 in Gangapur, Rajasthan, one adult woman's body was extricated on 7th day of the incident while in a similar operation in Kotputli, Rajasthan, where a 3-year-old girl fell into the borewell, the operation ran for 10 days. Borewell operations are innately complex and challenging that could run for multiple days.

This makes it imperative for the rescue agencies to plan and act fast so as to save the life of the entrapped victim. In Jan 2024, in a borewell operation in Dwarka District of Gujarat, where a 5-year-old victim fell into the Borewell at around 2 PM and wherein, NDRF team flown by Indian Airforce to incident site extricated the victim by 0830 PM; the victim could not survive while on the other hand in a 2006 famous borewell rescue case, the victim Prince was extricated alive even after 50 hours of the incident. Time is one but the most important factor for the survival of the victim.

8. **Adverse Weather Conditions** - Rainfall can significantly hinder borewell operations, especially during rescue efforts, by making the excavation process more challenging and potentially dangerous. Heavy rain can cause the soil to become unstable, leading to cave-ins and making it difficult for rescue teams to access the trapped individual.

Additionally, water accumulation in the borewell itself can further complicate rescue attempt. Surface water from heavy rainfall can even enter in borewell in case mouth of the borewell is in level to the ground. In Kotputli, borewell rescue in December 2024, rain and cold weather both hampered the operation. Similarly, working in very hot and humid weather also take toll on rescuers capabilities. The rescue teams should be physically and mentally ready to conduct rescue operation in challenging weather.

9. **Failure to provide immediate oxygen supply** - Borewells are often narrow, deep, and enclosed, limiting air circulation and oxygen availability. If a child falls into a borewell, their breathing can be obstructed, leading to a lack of oxygen. Hypoxia, or lack of oxygen, can be a serious hazard in borewell operations, especially when children fall into them. The confined space, potential for suffocation, and difficulty in accessing the affected individual can lead to hypoxia-related deaths.

Borewells can contain toxic gases or other substances that displace oxygen and contribute to hypoxia. Reaching and rescuing someone trapped in a borewell can be challenging, delaying the ability to provide oxygen. A fall into a borewell can cause injuries that further compromise breathing and oxygen intake. Medical teams and rescue agencies find it difficult to supply oxygen at such depths.

10. **Falling debris on child during rescue** - Different geographical regions have different kind of soils. At some places, digging parallel hole is difficult due to hard or rocky soil while in some instances, soil was so soft that it caved in the rescue hole itself. In one

Fig 3.6: Debris fallen on a borewell Victim during operation

borewell ops, the sand of the borewell hole was so soft that whenever the camera, torch, rope or pipe/rod was touching the side walls, sand and debris was falling on the victim. During rescue attempts, so much debris had accumulated on the victim that rescue team could not see the victim from overhead camera. Soft soil due to various environmental factors became so hard that rescuers struggled to make a passage through it.

In June 2019, in Bhagwanpura Village of Sangrur, Punjab, 2-year-old Fatehveer (victim) feel into an open borewell. The victim got stuck at a depth of 150 foot. The rescue operation lasted for four days. When the victim was shifted for medical examination, the treating doctors declared the him brought dead and cause of the death was suggestive of "hypoxia consequent to suffocation and smothering in a borewell".

11. **Age and weight of victim** - Most of time, the victims are toddlers and children only but in recent past there has been multiple cases of adults falling the borewell. The dynamics of rescuing adults from borewell in altogether different. In Feb 2024, 25-year-old women fell in 100 feet deep borewell in Sawai Madhopur, Rajasthan. Rescue teams of NDRF and SDRF worked tirelessly for 120 Hours to extricate the victim's body.

In a similar case, a 30-year-old man fell into an open borewell in Delhi Jal Board water treatment plant in March 2024, his body was extricated 12 hours later by NDRF team. In one more case, an 18-year-old girl who had been trapped at 540 foot in a borewell in Gujarat's Kutch district since brought out after more than 32 hours of joint rescue operations.

In all the three cases, victims could not survive. In Kutch borewell case, the victim slipped back twice because the J and V type hooks used for extrication failed due to adult victim weight. The extrication hooks carried by rescue teams are fabricated as per children weight. Rescuers need to keep weight of the victim in mind while extricating the victim using fabricated hooks.

12. **Non standardisation of equipment/process** - It's true that there isn't standardised equipment or procedure, specifically designed for borewell rescue operations. While there are some innovative robotic systems being developed, they are not yet deployed or universally considered the best approach. Current rescue methods often rely on manual digging parallel to the borewell, which can be time-consuming and risky. There isn't a globally or nationally recognised standard for borewell rescue equipment or procedures, leading to a variety of approaches.

While some robotic devices are being developed, they are not effective in all situations. The effectiveness of different rescue methods can vary significantly depending on the borewell's depth, diameter, and the child's condition. Borewells can vary significantly in depth and diameter, making it difficult to develop a single piece of equipment that works effectively in all case. Rescue operations are often time-sensitive, and the lack of readily available standardized equipment can delay the rescue process. Both, rescuer and the trapped child can be at risk during rescue operations, particularly with manual digging or the use of untested equipment.

Currently, rescuers are fabricating borewell rescue tools as per requirement of the operation. From iron rods, various shape of hooks, rings and devices were innovated by the rescuers as and when need arose. The weight of the iron rods is no much that it creates a wobbling effect as the depth increases. Rescue teams are still working on modernization of their rescue gears. Due to lack of standardized rescue gears, rescue teams had to face backlash of media and public in some borewell rescue operations.

13. **Challenging Terrain** - Tough terrain, particularly rocky ground, significantly complicates borewell rescue operations. The difficulty in digging through solid rock can delay the process of creating a parallel tunnel or pit to reach the trapped individual, hindering the rescue efforts and potentially reducing the chances of a successful outcome. Hard, rocky terrain can make it extremely difficult to dig or excavate a tunnel or parallel hole to access the child trapped in the borewell. This slows down the rescue process considerably.

Digging through rock requires specialized equipment and techniques, which can delay the rescue operation. The time taken to reach the trapped individual can be crucial.

Delays due to rocky terrain reduce the window of opportunity fora successful rescue, as the trapped person's condition deteriorates with time. Recent incidents, like the rescue attempts in Kotputli, Rajasthan, have highlighted the challenges posed by rocky terrain in borewell rescue.

In one such operation, in Dwarka District of Gujarat in January 2024, the victim was stuck at 50 foot in the borewell, while the excavators could not dig beyond 30 feet due to rocky terrain of the site. Rescuers had to rely on conventional methods in that situation for victim's extrication. In another, textbook case of Kotputli, Rajasthan borewell rescue case in December 2024, the rescuers hit an 8-foot-long rock at 165-foot depth while approaching the victim from parallel hole. Breaking such a huge rock with CSSR tools at such depth was an additional challenge for the rescue teams. The whole operation took 10 days to extricate the victim's body.

14. **Media, Public and Political pressure** - Borewell incidents often attract media attention, leading to sensationalised coverage that can undermine the calm and coordinated rescue efforts. The media's focus on timelines and outcomes can pressure rescuers to rush operations, increasing the risk of accidents. They might also spread misinformation or inaccurate information, further complicating the situation. Families and villagers affected by borewell incidents often express their frustration and anguish publicly, demanding immediate action and results.

This pressure can create a climate of fear and anxiety, making it difficult for rescuers to work effectively. Public pressure can also lead to the deployment of untrained individuals to the site, further endangering the situation. Politicians may feel compelled to take action to address public outcry, even if it means intervening in the rescue operations. This political pressure can lead to rushed decisions that prioritize political gains over the well- being of the child in the borewell. It can also lead to political maneuvering and competition, hindering the coordination of rescue efforts.

The constant scrutiny and pressure from the media and the public can put tremendous emotional strain on rescuers. In Kotputli borewell ops; local media, you-tubers, villagers and family members started questioning the efficiency of rescuers and equipment when rescue efforts were delayed due to complexity of operation. Rescuers need to be mentally prepared in such hostile environment.

15**. Lack of expertise by first responders** - Borewell rescues are complex and time-sensitive, requiring specific knowledge of soil dynamics, and specialised equipment. First responders in any borewell incidents are family members, villagers or community.

They may not have the necessary training to assess the situation accurately, choose the appropriate rescue methods.

16**. Status of consciousness of victim** - In a borewell rescue operation, monitoring the victim's consciousness is crucial. Rescue teams often use cameras and communication devices to assess the victim's alertness and respond accordingly. Techniques like touch sensors and voice communication can also help determine if the victim is alive and responsive. A responsive victim is prone to answer rescuer's queries, follow commands and provides a longer window for extrication. During a rescue operation in Dwarka, Gujarat, the victim was found unconscious. When rescuers tried to pull the victim out, due to her unconsciousness, her neck was falling behind and obstructing with the borewell side. Rescuers had to place one I shaped hook to support her neck from falling back and extricated her from the borewell.

17**. Humidity and Temperature in the Borewell** - Temperature and humidity levels inside a borewell can be significantly different from surface conditions. High humidity and temperature can increase the risk of dehydration and hyperthermia for a trapped person, especially if they are in a confined space with limited ventilation. The information gathered from temperature and humidity sensors helps rescue teams make informed decisions about ventilation, rescue techniques, and the level of urgency required. For instance, high humidity and temperature might indicate the need for more aggressive cooling measures and a faster rescue operation.

Recently, while responding to a borewell operations, rescuers used to stress upon oxygen supply only. But in recent case of Kotputli, Rajasthan borewell incident, when rescuers entered into 165-foot parallel well, they notice a huge variation in temperature and humidity inside borewell compared to surface temperature. In addition to oxygen, proper ventilation of the victim is equally important for safe extrication.

3.2 Borewell Rescue Equipment:

Rescue equipment plays a very crucial role in borewell rescue operations to ensure the safety and efficiency of the rescue process, allowing for a faster and more effective recovery of the trapped individual. Specific equipment aids in locating the victim, providing necessary oxygen and visibility, and facilitating safe extraction. Here's a more detailed breakdown of machines and equipment that are crucial in a borewell operation

1. Electric Winch/Come Along: Winch is a specialised rescue system, often involving a gripper or holding mechanism, is attached to the winch rope. The winch is positioned at the surface of the borewell. The rope is carefully lowered into the borewell, ensuring it reaches the trapped person. Once the gripper reaches the person, it's activated to secure them. The winch motor is then used to pull the rope, lifting the person and the gripper upwards. The process is carefully controlled to ensure a smooth and safe ascent. Once the person is safely at the surface, the gripper is released, and the person is taken out of the rescue system. Similarly, a "come along" is a device used to provide mechanical advantage for pulling or lifting objects, such as a trapped child or a rescue tool, from a borewell. These devices can be rope-based or hydraulic, allowing rescuers to efficiently lift or pull objects without excessive manual effort.

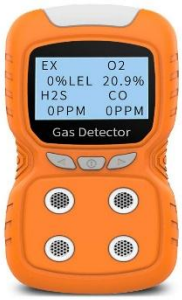
2 Borewell Camera: Borewell rescue operations often utilise cameras for real-time monitoring of the situation and to guide rescue efforts. These cameras, lowered into the borewell, provide visual data, including the victim's location and condition, which helps determine the best rescue strategy. Additionally, environmental sensors can be

integrated with the camera system to monitor temperature, pressure, and gas levels within the borewell, aiding in ensuring the safety of both the victim and the rescue team. Real-time monitoring and data analysis can significantly improve the efficiency of the rescue operation. The data provided by the camera system can help rescuers make informed decisions about the rescue strategy, minimizing risks and maximizing chances of success. LED torch attached to the borewell camera helps to analyze the victim position and movement in darkness. Borewell camera should have following features to withstand complexities of borewell rescue operation; Ultra High-Resolution Colored Picture, Low light operation, LED underwater light, stainless steel housing, military grade waterproof cable, ability to attach up to deep place and stand large pressure of water, 100% water proof.

3. **Thermal/Infrared Camera**: Infrared (IR) cameras are indeed used in borewell operations for various purposes, especially for inspection and rescue. In unfortunate incidents where a child falls into a borewell, IR cameras can be used to locate the child in the dark or low-light conditions of the borehole. The camera can detect the child's heat signature, aiding in rescue efforts. IR cameras can be integrated into rescue systems to provide real-time visual and thermal data to rescuers.

4. Chipping Hammer: In borewell rescue operations, they are used to carefully widen the pit or to chip hard rocks to allow for rescue of the victim. It is mainly used

to create a space for access to the trapped person. This is often done by digging a crater parallel to the borewell, making it easier for rescue workers to reach the individual and facilitate their rescue.



5. Gas Detector: Gas detectors are crucial in borewell rescues, providing real-time information about the atmosphere inside the well, allowing rescuers to assess the safety of the environment and the victim. These devices can detect harmful gases like carbon monoxide, methane, and other toxic substances that may be present in the borewell, ensuring the safety of rescue personnel.

3.3 Supportive Borewell Equipment

1. **Rescue Rings**: Borewell rescue rings are iron rings designed to aid in the rescue of individuals, especially children, who have fallen into open borewells. In most of the borewell rescue operations, rescuers have used customised iron rings of different sizes to help pull victims out. These rings are lowered into the borewell using a rope and

secured around the victim's body or limbs, allowing rescuers to lift them up. While this method can be effective, it's not always successful and may require parallel excavation or other rescue techniques. The iron rings are designed to fit snugly around the victim limbs, with a small gap to allow for maneuverability. Rescuers lower the ring down, aiming to secure it around the victim's shoulders, hands or other parts of the body. Once these rings are fitted in victim's limb, the rope attached around these rings are pulled to fix the rope in victim's hand and the victim is pulled out using these ropes.

2. **Iron Rods** - In borewell rescue operations, iron rods are used to lower down metal rings and hooks that assist in extracting a trapped person. They may be used to create access points or to support the victim during extrication. The various types of rescue hooks attached to these iron rods are strapped to victim clothes. The victim is supported using multiple hooks and pulled out of the borewell. One end of these iron rods is threaded so that multiple iron rods could be attached and lowered in the borewell to desired depth.

3. **Hooks** - Iron hooks are one of the most useful utilities in conducting a successful borewell rescue operation. These hooks are attached or welded to the end of the iron rod that is lowered in the borewell. Hooks are entangled in victim's cloths to pull the victim out providing support at multiple places simultaneously. These hooks should be fabricated keeping in mind the weight of the victim to avoid its failure. The metal used in the hooks should be strong enough to lift the victim weight without failure. Currently, rescue teams use different types of hooks as per requirement of the operation. Some of them are J Hook, Y hook, X hook etc. If the weight of the victim is more, multiple hooks could be used to distribute the weight over larger surface area so that probability of failure of hooks could be minimised.

4. **Under Support** - A borewell can have a narrow opening and unstable sides. If a child falls, they may be unstable and prone to sliding further down. Support from below, like a platform or airbag, helps to stabilise the child and prevent them from falling further.

L shape Hook for under support

Magic Ball

Support from beneath a trapped borewell victim is crucial for safe and successful rescue. It provides stability, prevents further falls, and allows for the safe extraction of the victim. Without adequate support, the victim could be injured during rescue or slide further down the borewell, making the rescue more difficult and dangerous. Support allows rescuers to use devices like robotic arms, ropes, rings or pulleys to gently lift the child out of the borewell without causing injury.This is especially important in deep borewells where traditional methods of pulling the child up with a rope may be ineffective. A safe and stable platform or airbag provides a secure resting place for the child while rescuers work

to locate and extract them. This is essential for minimizing the risk of injury and ensuring the child's well-being during the rescue operation. Pendant Jhula, Magic balls and L hook, shaped like letter 'L' is used by rescue team to support the victim from falling further down. L hook attached to metal rod is inserted through gaps of borewell wall to provide a platform like support to borewell victim. Rescuers while using L hook shall ensure that it is strong enough to support victim's weight. Victim may slide further down in the borewell in case L hooks or support fails.

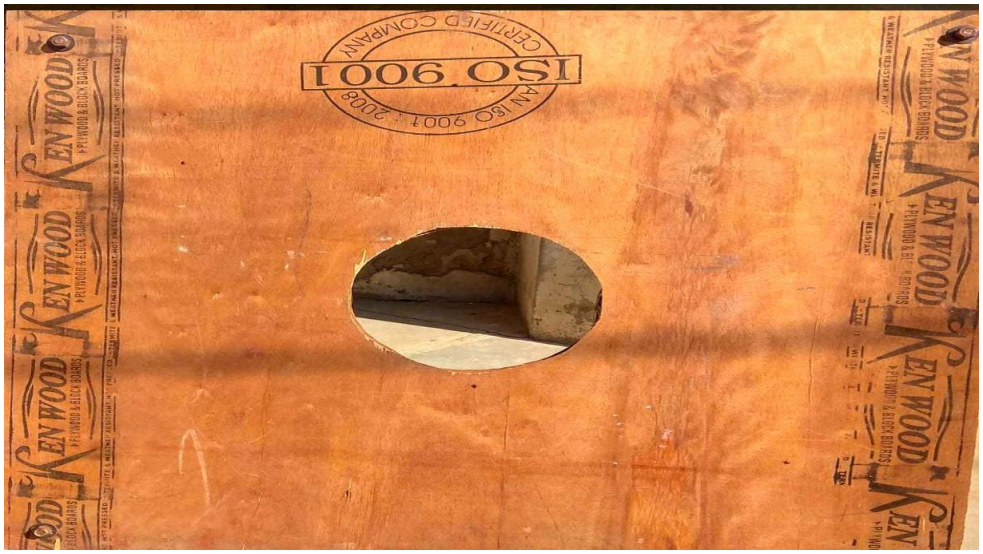
5. **Lighting Tower**: Lighting towers provide essential illumination for borewell drilling and rescue operations, enhancing safety and efficiency. They are particularly valuable for nighttime work or in areas with limited natural light. They enable continuous rescue operations, even when daylight is not available, maximizing the potential to finish the borewell rescue operation quickly.

6. **Foldable Aluminium Ladder**: Aluminium ladders are used in borewell rescue operations to provide access and support for rescuers and equipment, particularly when a parallel hole is dug for access. The ladder allows rescuers to descend into the newly dug hole and reach the child trapped in the borewell, Rescuers can use the ladder to transport equipment, such as tools, ropes, and oxygen tanks, into the borewell and the parallel hole.

7. **Iron Rod holding Clamps**: Iron rods are heavy in weight. Rescuers have to use multiple such rods to reach to the victim.

Holding such a heavy weight of iron rods for long is not possible. Rod holding clamps are the devices which holds the iron roads at a place with the help of nut and bolts.

8. **Borewell Cover Board**: It is a wooden board having hole in the centre symmetric to



borewell diameter and placed on the mouth of borewell to avoid debris, sand or grit falling into the borewell.

9. **Portable Generator**: A portable generator plays a crucial role in borewell rescue operations by providing power for essential equipment and systems. These generators are used to power lights for visibility, communication devices, robotic arms or other specialized tools, and in some cases, even air supply systems within the well.

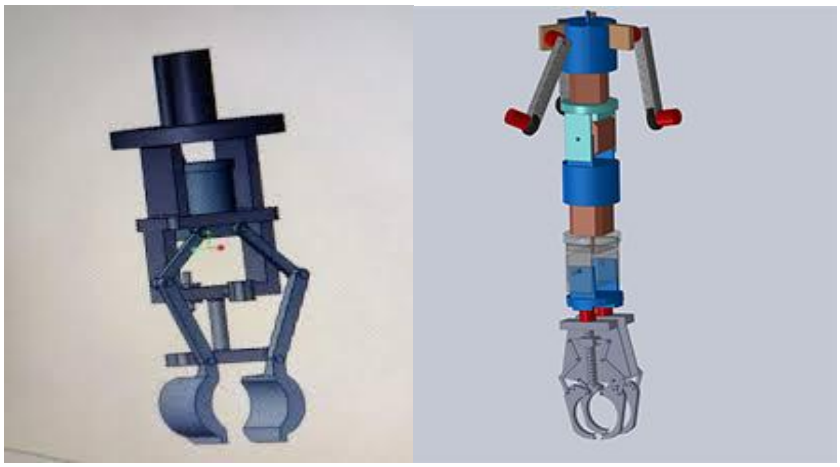
10. **SCBA Set** : Borewells can be extremely dangerous, lacking oxygen and potentially containing toxic gases or dust. Rescuers need protection from these hazards to safely enter the borewell and carry out their duties. In borewell rescue operations, a Self-

Contained Breathing Apparatus (SCBA) is crucial for rescuers who need to descend into a borewell to retrieve a trapped individual. SCBA provides a reliable source of

breathable air in oxygen-depleted or hazardous environments, making it essential for the safety of rescue personnel.

3.4 Technical Borewell Rescue Equipment

1. **Robotic Grippers**: Robotic grippers play a crucial role in borewell rescue operations by providing a safe and controlled method for lifting individuals trapped within the narrow borewell environment. These grippers, often integrated into rescue robots, are designed to hold the victim firmly and gently, ensuring their safe extraction. Robotic Grippers are not very commonly used in borewell rescue operation as these grippers are in development stage and their ground utility is yet to be tested.



2. **Communication Equipment**: In borewell rescue operations, communication equipment is crucial for coordinating the rescue effort and communicating with the child trapped within. This includes devices like microphones, and speakers integrated into rescue robots or other equipment, as well as communication systems like radios or teleconferencing for direct contact with the child. These devices enable communication with the child, allowing rescuers to provide instructions, reassurance, and medical assistance while also allowing the child to communicate their needs and concerns. Radios (e.g., walkie-talkies or specialized underwater communication radios) facilitate communication between the rescue team on the surface and any personnel working inside the borewell, ensuring coordination and information sharing. Teleconferencing systems can be used to provide direct communication with the child, allowing rescuers to build rapport, offer support, and assess their emotional state.

****

Lesson No. 04

Borewell Incident Response & Rescue Techniques:

Objectives:

4.1 Primary assessment of borewell rescue incident

4.2 Inter-agency coordination in Borewell Rescue

4.3 Borewell Incident Response procedure

4.4 Rescue techniques used in Borewell Rescue.

4.1 Primary assessment of borewell rescue incident

An initial assessment of a borewell rescue incident is a critical, multi-faceted process conducted by first responders to understand the situation, evaluate risks, and establish a rescue plan. Given the high fatality rate and complexity of these incidents, a rapid and accurate assessment is essential for a successful outcome.

On-site hazard and scene assessment:

- Establish site control: Secure a perimeter around the borewell to keep onlookers and non-essential personnel at a safe distance. This is crucial to prevent additional accidents and create a clear workspace for rescuers.
- Prevent further descent: Immediately take action to stop the victim from falling deeper into the well. This may involve using ropes, hooks, L hook Support or other specialized tools.
- Assess the environment: Evaluate ground stability around the borewell to prevent a potential collapse, especially if parallel digging is being considered.
- Consider the weather: Account for rain, as it can complicate the operation by introducing mud, causing the borewell to flood, and making rescue conditions more difficult and unstable.
- Deploy protective barriers: Cover the top of the borewell with a large plastic sheet to protect the victim from falling debris and to shield the rescue area from the elements.

Victim and borewell status assessment:

- **Locate the victim**: Deploy a high-resolution camera with night vision (Thermal or Infrared) and an LED light source into the borewell to determine the victim's exact depth and position. An infrared sensor may also be used for higher accuracy.

- **Check the victim's condition**: Monitor the victim's movements and vital signs (if possible) through the camera feed. Use an integrated communication system with a microphone and speaker to establish contact with the victim. This helps keep them calm and allows rescuers to assess their responsiveness.
- **Analyse the borewell's internal environment**: A gas monitor is essential to check oxygen levels and detect the presence of toxic gases like carbon monoxide. Recommended oxygen levels in confined spaces are between 19.5% and 21.5%. If oxygen is low, establish a line to continuously supply fresh oxygen. A temperature sensor can provide insight into the conditions and even help verify the victim's vitality.
- **Inspect the borewell's structure**: Evaluate the diameter of the well and the soil or rock composition, as these factors determine the rescue methodology and timeline. Hard rock can significantly hinder parallel digging efforts.

4.2 Inter-agency coordination in Borewell Rescue

Effective inter-agency coordination in borewell rescue operations is crucial for a rapid, safe, and successful outcome. This requires a well-defined chain of command, clear roles, and seamless information sharing between multiple government bodies and specialized teams

Key agencies and their roles

1. National Disaster Response Force (NDRF)

- The apex body for borewell disaster response, often mobilized upon request from state authorities.
- Role: Deploys highly-trained Search and Rescue (SAR) teams equipped with specialized or improvised tools and camera systems, to handle the rescue operation.

2. State Disaster Response Force (SDRF)

- The State body for borewell disaster response. First to respond along with other rescue agencies.
- Role: Deploys trained Search and Rescue (SAR) teams along with other rescue agencies.

3. State Disaster Management Authority (SDMA)

- The primary state-level authority responsible for coordinating all disaster management efforts within a state or union territory.
- Role: Issues official requisitions to the NDRF and directs the mobilization of state-level resources.

4. District Disaster Management Authority (DDMA)

- The district-level body headed by the District Collector or Magistrate.
- Role: Serves as the first point of contact and initiates the initial response at the incident site.

- The DDMA can also formally request NDRF assistance from the SDMA.

5. Local emergency services.

Police: Manage crowd control, establish a security perimeter, and manage traffic to allow rescue equipment access.

Fire and Rescue: Provide on-site technical expertise and support for rescue operations.

Health Authorities: Mobilize medical teams to provide immediate medical assistance and stabilize the victim upon rescue. This includes providing oxygen and first aid within the borewell itself.

Coordination framework

1. Initial notification and assessment

- A rescue operation begins when local authorities or citizens report an incident to the district administration.
- The DDMA performs a rapid on-site assessment to determine the nature of the emergency and the need for specialized assistance.

2. Escalation and mobilization

- If specialized equipment or skills are required, the DDMA notifies the SDMA.
- The SDMA, in turn, formally requisitions the SDRF/NDRF, mobilizing their Search and Rescue teams.

3. On-site command and control

- An on-site commander from the SDRF/NDRF or DDMA establishes a unified command to oversee all operations.
- An Incident Command Post is set up to ensure all agencies are operating under a single, coordinated strategy.

4. Rescue execution

- The NDRF leads the technical rescue using its specialized equipment, while other agencies provide critical support.
- Fire and Rescue Services may assist with heavy lifting or other technical tasks.
- Medical teams are on standby and ready to provide immediate care, including oxygen supply inside the borewell and treatment for injuries or hypothermia.

5. Post-rescue demobilization and accountability

- Following a successful rescue, all agencies are debriefed, and a post-incident analysis is conducted to improve future responses.
- The incident is officially concluded, and resources are demobilized.

4.3 Borewell Incident Response Procedure:

NDRF teams have responded successfully to various Bore well / well rescue incidents in the past. Response to such incident is completed in five phases viz.

i. Preparedness Phase

ii. Activation and Mobilization Phase

iii. Operation Phase

iv. Deactivation and Demobilization phase

v. Post Operation Phase

Fig 4.1 Rescuers during a borewell rescue operation

1. Preparedness Phase:

Following preparation level is expected from all the battalions of NDRF at any given time for launching bore well incident response.

- ❖ Training of rescuers regarding bore well rescue equipment.
- ❖ Practices of different rescue methods and approaches in different situation/work site.

- ❖ Practices of vertical and horizontal shoring of vertical wall of ditch
- ❖ Ensuring working of all borewell rescue equipment.
- ❖ Practice of horizontal digging in a vertical borewell.
- ❖ Research and development in field of Borewell Rescue.
- ❖ Liaison with civilian experts in borewell rescue.
- ❖ Collection of data from State Government regarding presence of borewells.
- ❖ Borewell rescue mock drills in night and adverse weathers.
- ❖ Community Awareness - Pre-Bore well incident preparedness also includes awareness programmes for community. These programmes are conducted to focus on creating an awareness among the community. Keeping in view that Bore well incidents are increasing in various parts of the country, all NDRF units have been directed that while conducting various community awareness programmes, our teams should also spread awareness about Borewell and safety measures to be taken to avoid recurrence of such incidents. During the awareness, the villagers are advised to take following safety measures: -
  - The simplest solution is to seal the mouth of the hole the moment it is not in use.
  - Erection of barbed wire fencing or any other suitable barrier around the Bore well.
  - Placing a big flat stone to cover the hole of Bore well or construction of cement/concrete platform.
  - Capping of well assembly by welding steel plate.
  - In case of pump repair, the tube well should not be left uncovered.
  - Filling of mud pits and channels after completion of construction/repair work.
  - Filling of abandoned bore well by clay/sand/boulders/pebbles/drill cuttings etc. from bottom to ground level.

2. Activation and Mobilisation phase:

This phase is activated after receiving of information or call for help from the authenticated source. Team has to obtain all information about incident through control room/ops officer in charge:

- ❖ Incident type, place, date and time.
- ❖ Depth and diameter of bore well and location and status of trapped victim.
- ❖ Nature of soil (Rocky, Sandy or soft soil etc,)

- ❖ Incident site condition, whether confined or in open area, in case of confined area nearby adjacent houses and its distance from incident site.
- ❖ If needed, demand for heavy equipment like Excavators, Piling Machine etc for digging should be made at the earliest.
- ❖ Availability of Ambulance, Doctors, Oxygen cylinder and oxygen flow pipe.
- ❖ Rescue efforts done till now by first responders.
- ❖ Provisions for ventilation of victim in the borewell
- ❖ Any other agency involved.
- ❖ Availability of lighting facilities.
- ❖ Team Commander should be in constant touch with civil administration for latest on-site development.

3. Operations phase: On arrival at the incident site,

- ❖ Team shall establish base of operation & secure the scene.
- ❖ Consult with local authorities and gather all required info/data.
- ❖ Team commander will assess the situation/condition of victim, availability of heavy equipment, depth at which victim trapped.
- ❖ Officer in charge/team commander will assess the nature and condition of soil with the help of irrigation department specialist/engineers.
- ❖ In case of confined space, officer in charge/team commander will also evaluate the condition of adjacent building/construction with the help of civil engineer and representative of civil administration before execution of approach strategy to trapped victim.
- ❖ Demand for additional requirement of shoring material.
- ❖ Demand for additional requirement of heavy equipment.
- ❖ On site availability of medical staff ambulance etc.
- ❖ Confirm and update all info obtained in the activation/mobilisation phase.
- ❖ Make planning and priorities to approach and safe evacuation of victim.
- ❖ Assign tasks to rescue squad.
- ❖ Reassess the situation and make necessary adjustments.
- ❖ Keep providing psychological support to victim as well as the family members. If the victim

is conscious, seek his help to pull with improvised equipment

Fig: 4.2 Rescuers cutting hard rock surface in a borewell rescue operation

- Gain access to the victim by break/breach/dig or any other way as accordance with situation.
- When using parallel digging method, safety precautions for the rescuers must be ensured.
- Make sure that in the endeavour of approaching, the walls of borewell do not collapse. Parallel digging should be sufficiently far enough in case of loose soil.
- When the pipe of the bore well has already been removed do not use improvised rescue umbrella, the sticks may get hooked with the bore well wall.
- If the borewell is situated near a water body like canal or pond, ensure availability of water pump for dewatering the borewell.
- Secure the scene by cordoning the bore well to avoid any unwanted objects falling into the bore well and causing harm to the child and thus hamper the rescuing efforts.
- Cordon the affected area and control unnecessary movements/crowd gathering near the bore well.
- Try to stabilize the victim, if possible, with the help of rope.
- Make arrangements for supplying of oxygen to the child with the help of pipe.
- Arrangement of sufficient lights in the area for the night operation.

- Immediately contact the nearby NDRF Unit, if required.
- District medical officer should be made aware about the compartment compression syndrome and action to be taken in such cases.
- Extricate and stabilise the victim, provide ventilation.
- Send the victim for higher medical care immediately.

4. De-Activation/Demobilization Phase:

- The clearance from State and districts must be taken after termination of Ops.
- Request administration for early filling of dug earth.
- The team shall collect feedback, need to improvement and make brief report for submission to NDRF HQ within 15 days after termination of operations.
- The team shall thoroughly check all TEAs used during Ops and report of breakage/ loss/theft and malfunction shall be brought to the notice of NDRF HQ.
- The Chief Medical Officer shall ensure to conduct medical examination of all the rescuers after arrival from the operational area and shall give prescription and shall take action, as required.
- Unit shall conduct Post Trauma Stress Disorder (PTSD) and stress related classes on regular basis. Whenever required help of the psychiatrist shall be taken from the nearest medical authorities.

5. Post Operation Phase:

- De-briefing should be done at the earliest.
- Check tools, equipment and accessories thoroughly and conduct maintenance.
- Impress and brainstorm upon lesson learnt and things to improve.
- Proper documentation, case study should be prepared for institutional memory

4.4 Rescue techniques used in Borewell Rescue.

There is no standard rescue method in borewell rescue operation. Choice of rescue method depends on various factors like width of borewell, availability od space, status of child, support from victim etc. One rescue technique used in one borewell incident may or may not prove useful in another incident. NDRF teams has done multiple borewell rescue operation and has come up with various rescue techniques that had proved successful in the past. At this juncture, it would be important to mention the contribution of Researchers in borewell rescue operation, Mrs. Suman Sharma and Mr. Krishan Kumar Sharma, who have researched in this domain and came up with some rescue techniques which has been briefed in detail in this chapter.

1. Pendent Jhula Method:

The "Pendent Jhula" (swing) rescue technique in borewell incidents refers to a method where a device, often resembling a cradle or platform, is lowered into the borewell to cradle the child and then lift them to safety. This technique is particularly useful when the child is stuck at the base of the borewell and there is enough space for this device to lower down. When the victim is conscious and at the base of the borewell, victim can be instructed to step on the swing and extricated slowly.

This technique won't be helpful if the victim is stuck somewhere in the middle of the borewell and there is no or very little space for maneuvering this device.

2. Magic Ball Method:

The "magic ball" rescue technique is part of a broader set of tools and methods used in borewell rescue operations, to retrieve children who have fallen into abandoned or improperly covered borewells. This technique involves using an inflatable balloon-like structure to create a cushion around or under the child and then lift them to the surface. It's often used in conjunction with other equipment like J-hooks, cloth buckets, and pendant jhula etc.

The "Magic Ball" refers to an inflatable balloon or cushion or airbag that is designed to fit within the borewell's diameter. The ball in deflated position is lowered in the borewell from available gaps near stuck victim. Once lowered into the borewell and placed under the victim feet, the "magic ball" is inflated from outside of the borewell, creating a soft, supportive surface around the child. The inflated ball is then gently raised, bringing the child up with it. The "magic ball" is not used in isolation. It's often part of a larger rescue system. This rescue technique can be highly useful for extricating victims that are stuck in the middle of the borewell.

3. Cloth Bucket Rescue:

The cloth bucket rescue technique, is a manual approach used in borewell rescue operations to safely extract a child trapped in a narrow well. It involves lowering a specially designed

cloth bucket or sling into the borewell to securely cradle the child, and then carefully hoisting them back up.

A sturdy, flexible cloth bucket or sling is prepared, often with padding to protect the child. It's designed to distribute the child's weight evenly and prevent injury during the extraction. Through the natural gaps available between victim's body and borewell walls, the bucket is carefully lowered into the borewell, guided by a rope or cable, until it reaches under the child. The child is gently placed inside the bucket or secured within the sling. The bucket or sling is then slowly and steadily pulled back up, ensuring the child remains stable and supported throughout the process.

4. Cane and Stick/ J hook Method:

In this rescue method, the long pole or cane attached at one end is lowered on the borewell. The lowered end of the cane shall have rubber padding to minimize injuries to the victim. The cane is placed under victim and victim is slowly pulled up. Since, in most operations victims are stuck at larger depths, NDRF team use hooks to pull out the victims. Metal hooks of various shapes and sizes as per requirement are lowered in the borewell using iron rods. These hooks are stuck in victim clothing. These hooks are never used in isolation but used along with O rings, ropes and L hooks. When all equipment is placed in position, the victim is lifted up using hooks while providing support from beneath using L hooks. he whole gamut of equipment works in tandem to successfully retrieve the victim.

5. "**O" ring Method** : This is one of the time tested and most versatile method used by rescue teams during a borewell rescue operation. The O-ring technique, in the context of borewell rescue, refers to a method of using a flexible size, circular ring, often made of iron or a similar material, to create a seal around a victim's extremity e.g. hands or feet. This seal can be used to help stabilize the person, prevent further descent, and potentially aid in their extraction. A loop of rope around O ring is created so that when rope is pulled, the rope de-attach from the ring and wrap around Victim hands and feet. Once victim hands are tied to the rope, victim is pulled out safely placing L hook or ballon support under the victim.

6. Three rope loop Method: In this rescue technique, O rings of size more than victim's body width is used. This rescue technique works well only when the victim is in the base of the borewell and there is enough space for lowering of O rings of that width. A loop of rope around O ring is created so that when rope is pulled, the rope de-attach from the ring and wrap around Victim Body. Three loops of rope are lowered in the borewell and a noose is formed near victim's leg, torso and chest. Once loops are in in place, victim is slowly pulled up for extrication. The rope used in this technique should be soft enough to form an easy loop and prevent injury to victim but strong enough to carry victim's weight.

7. Umbrella Technique: The umbrella technique in borewell rescue involves using a circular, expanding structure, resembling an umbrella, to create a stable platform below the trapped individual. This allows rescuers to lift the person out of the borewell safely, preventing them from slipping further down. The "umbrella" is typically a metal frame with flexible arms that can be expanded and retracted. When lowered into the borewell, the

frame expands, creating a base or platform beneath the victim. This prevents them from sinking further and provides a stable surface for lifting.

Advantages:

- The umbrella structure prevents the victim from falling deeper into the borewell.
- It provides a secure base for rescuers to attach lifting mechanisms and safely pull the person out.

Limitations:

- The effectiveness of the umbrella technique can be limited by the borewell's diameter and the victim's position.
- In some cases, the umbrella structure might get stuck or not be able to properly grip the victim.

8. **Bracket Method:**

The bracket rescue technique in borewell rescues typically involves using a supporting bracket to stabilize and lift a child trapped in a borewell. This method is part of a broader category of equipment to safely extract individuals from borewells. A metal rod equipped with a folded supporting bracket, which is designed to fit under the child's body is lowered

under victim's body through natural gaps. The bracket is carefully positioned to provide support to the child.

As per requirement of the rescue operation, a single metal bracket or multiple brackets could be used.

9. Universal Rounded Jaal/Net Yantra:

The "Universal Jaal Yantra" or "net system" is a rescue technique used in borewell rescues, involving a net-like device to safely retrieve a child trapped in a borewell. This method is part of a broader category of robotic or mechanical systems designed for borewell rescues, offering a more controlled and potentially safer approach than traditional methods.

Here's how the "Universal Jaal Yantra" or net system typically works:

- **Deployment:**

The net system, often a robotic or remotely controlled device, is lowered into the borewell.

- **Positioning:**

The system is maneuvered to surround the child, forming a protective cage or net around them.

- **Securing:**

The net is secured to prevent the child from falling further down the borewell.

- **Lifting:**

The system, along with the secured child, is then slowly and carefully lifted out of the borewell.

The "Universal Jaal Yantra" or net system is designed to:

- **Provide a safer alternative:**

By surrounding the child with a net, it minimizes the risk of injury during the retrieval process.

- **Offers a controlled lift:**

The system allows for a more controlled and stable lifting process compared to direct pulling or manual methods.

- **Reduce the risk of further complications:**

The net can help prevent the child from getting stuck or injured by the borewell walls during the rescue. This technique is often used in conjunction with other rescue methods, such as parallel pit digging, to create a comprehensive rescue strategy.

****

Lesson No. 05

Parallel Digging & Soil Strata:

Objectives:

5.1 Heavy Earth Moving Equipment

5.2 Parallel Digging Method

5.3 Soil Strata

5.1 Heavy earth moving equipment:

1. **Pilling Machine**: In borewell rescue operations, piling machines, also known as piling rigs, are used to dig a parallel or adjacent pit to the borewell, allowing rescuers to access the person trapped inside. This method is employed when other methods like direct extraction or the "rope rescue technique" prove unsuccessful. The piling machine helps create a parallel tunnel or pit, enabling rescuers to reach the trapped individual safely.

Piling machines are heavy machinery that can create deep vertical holes in the ground, making them suitable for digging a parallel pit to a borewell. In many borewell rescue operations; where rescue teams were not able to retrieve the victims using rope rescue technique, need for piling machine had been felt.

Piling machine was used to dig a parallel well beside main borewell so that rescuers could enter and extricate the child. Rescue teams should make an early and informed decision whether to engage heavy equipment like Piling Machine as these equipment takes time to reach at incident site from urban centre.

Piling machines are typically brought in when a child is trapped deep inside a borewell (e.g., 150 feet) and direct rescue attempts are unsuccessful. The piling machine drills a separate, parallel tunnel alongside the borewell to the same depth. Once the parallel tunnel is complete, a smaller tunnel is dug to connect it to the borewell, allowing rescuers to reach the child.

Piling machine capacity varies significantly, measured in metrics like drilling depth (e.g., up to 59m or more), pile diameter (e.g., 400mm to over 2000mm), and lifting capacity (e.g., 185 kN). Smaller tractor-mounted rigs can handle depths of 50-150 feet, while larger hydraulic rigs are designed for deep foundation work. The specific capacity depends on the machine's type, and intended application.

2. Excavators: Excavators are heavy construction machines used for digging and moving large quantities of earth, rock, or other materials. They are equipped with a hydraulic arm and bucket, allowing them scoop up and transfer materials efficiently. These machines ae used in various industries, including construction, mining, and landscaping. These machines are used to dug parallel trench at an inclined angle to make an approach route to the victim. In borewell rescue operations, excavators can be crucial for digging a parallel pit to reach the trapped individual. This method, often used alongside ring rescue allows rescuers to access the borewell from the side, providing a safer and potentially faster way to reach the person than direct descent. Excavators are primarily used to dig a parallel pit adjacent to the borewell. This pit is dug to the same depth as the trapped individual, allowing rescuers to tunnel horizontally to reach them. The depth of the borewell and the location of the trapped individual are crucial factors in determining the best approach. If the person is relatively shallow, excavating might be sufficient, but deeper rescues often require piling machine. Excavator capacities are defined by multiple performance metrics, including bucket capacity, lifting capacity, digging depth, and travel speed. These factors vary significantly depending on the excavator's size, from compact mini models to large mining machines. Factors that influence capacity of Excavators during borewell rescue operation are; Excavator size and weight, Hydraulic power, Attachments, Material and ground conditions and Operator skills.

3. Rock Breakers: Rock breakers, also known as hydraulic hammers or demolition hammers, are powerful tools used to break rocks, concrete, and other hard materials in various industries. They are typically attached to excavators or backhoes and operate using hydraulic power. These machines are versatile and efficient, enabling operators to complete tasks quickly and effectively. In borewell rescue operations, rock breakers, specifically hydraulic rock breakers, are used to break through hard rock formations when digging a parallel well to reach a child trapped in a borewell. These machines are essential when the soil composition is rocky and traditional digging methods are ineffective. When a child falls into a borewell, rescue teams often dig a parallel well to reach the child. If the soil is hard and rocky, a hydraulic rock breaker is used to break up the rock, making it easier to excavate the parallel well. The use of rock breakers is crucial in challenging geological conditions, ensuring a faster and safer rescue by facilitating the digging of a parallel well. While effective, rock breakers

require specialized expertise and can be time-consuming. In some cases, even with rock breakers, the rescue can take a significant amount of time, and there is a risk of the borewell collapsing further due to its vibration, making the situation more dangerous.

5.2 Parallel Digging Method

As of now there is no scientific or reliable method is available, only manual rescue method is used to save the child fell into the bore well, where a big hole is dug beside the bore well to the depth of the child stuck. But this process requires large number of human resources such as rescuers, heavy machinery such as tractors, JCBs etc., even if there is a little delay in accumulating these resources reduces the chances of the child being saved alive. If in case there is a huge rock at certain depth in a bore hole results in re-initiation of whole process. This process consumes more time, in such cases the chances of saving child alive is very less.

Fig 5.1: A parallel borewell hole to rescue the victim

If the child is closer to the surface a rescuer gets in and pulls them out. However, if the child has fallen to greater depths, a camera is sent into the hole and then a parallel bore is dug nearby. From depth of parallel bore, another horizontal bore is dug. Quiet often the rescue succeeds but not always. A lot of Geology is involved and rescue plans must be fast and precise. But even with the best geophysical instruments, it is not easy to estimate the type and size of rock that blocks access to the point where the child is stuck. Moreover, drilling through rock can make the entire Bore well collapse. As on date the simplest solution should be to seal all the holes the moment they are not used. Sadly, this negligence and ineptitude devours a child.

Parallel Digging: - In this method a parallel hole is dug adjacent to the bore well depending on geology of the area and once the vertical digging reaches the depth at which the child is stuck a horizontal hole is drilled to reach the child and before reaching near stuck child and cover the bore well hole through pointed Iron rod or wood beneath the child.

To ensure that less time is wasted in horizontal drilling, the vertical hole drilling should always be planned in a manner that it is slanting towards the bore-well, instead of being perpendicular to earth and parallel to the bore-well. This makes it easier to extricate the child by reaching about 3 feet underneath the child at a distance of 1-2 feet from bore-well. This saves a lot of time in horizontal drilling and subsequent earth removal. This requires proper centering while drilling to ensure that we at exact place where the child is stuck.

Rescue teams need to take following action to extricate the victim using parallel digging method:

1. Assess Site & Victim Position- Confirm Depth, Geology.

Accessing the victim and determining their exact position in a borewell rescue involves using a camera-equipped probe for real-time visualization. Rescuers use this information to decide between manually extracting the victim if they are close to the surface or creating a parallel bore to a horizontal passage to reach them for a more complex extraction. The Geology helps identify the type of soil or rock surrounding the borewell. This information is crucial to predict how the borewell wall might behave during rescue efforts.

2. Coordinate With Agencies

Borewell rescue operation is a multi-agency operation. Rescue teams need to coordinate with Civil Admin for Clearance, Police for Perimeter protection, Medical teams for On-Site care of victim, Engineers/Geologists to seek technical advice and Fire Services for tools/lighting at the incident site.

3. Deploy Equipment- Excavators, Drilling Rigs, Shoring Materials.

After site survey, heavy equipment like drilling machines, excavators, and rock breakers are deployed to create a parallel tunnel for rescue and stabilize the borewell.

4. Dig Parallel Shaft- Adjacent to Bore Well, Maintaining Safe Distance and Shoring Walls.

Digging a parallel shaft in a borewell rescue is a complex operation where rescuers excavate a separate, nearby pit maintaining a safe distance to reach the trapped person. The goal is to create an L-shaped tunnel or connect the parallel shaft to the borewell to provide access for rescue. This method uses large excavation equipment and requires significant manpower.

5. Match Depth- Stop Vertical Digging at Victim's Level.

In a borewell rescue, vertical digging should stop once the rescue team confirms the victim's depth, as further vertical digging is unnecessary and potentially dangerous. At the confirmed depth, the rescue operation shifts to digging a horizontal tunnel to reach the child, but this is a critical juncture where the digging must be precise to avoid further harm. Rescue operations often begin by lowering a rope to measure the victim's depth before proceeding with any digging

6. Drill Horizontal Tunnel- Toward Bore Well.

Horizontal digging, or the "parallel pit method," involves digging a large-diameter pit parallel to the borewell down to the victim's depth, then creating a horizontal tunnel to reach and extract victim. This method is typically employed when other techniques, such as using a robotic arm, iron rods are unfeasible due to obstructions, the victim's position, or a lack of specialized equipment.

7. Protect Victim- Insert Iron Rod/Wood Beneath to Block Debris.

In Horizontal tunnel, rescuers may attempt to insert a wooden block or similar platform beneath the victim in a borewell to prevent them from slipping deeper. This is done as a safety measure, often in conjunction with digging a parallel pit, to stabilize the victim before a rescue worker can reach them.

8. Break Through & Extract- Safely Access and Lift Victim via Parallel Shaft

Rescuers reach the victim through the horizontal tunnel, secure them, and then lift them out of the parallel pit.

9. Post-Rescue- Medical Handover, Secure Site, Debrief.

After a borewell rescue, the immediate priority is comprehensive medical evaluation and treatment for potential hypoxia (lack of oxygen), hypothermia (low body

temperature), dehydration, malnutrition, internal injuries from equipment, and psychological trauma. Victims are at risk due to the confined, oxygen-deprived, and potentially hazardous environment of the borewell, requiring intensive care and monitoring for complications. The primary steps to secure the site involve permanent sealing with materials like sand, gravel, and a cement-based grout, installing a protective cover, and removing surrounding hazards like tools, equipment, and excavated earth to prevent future accidents or incidents.

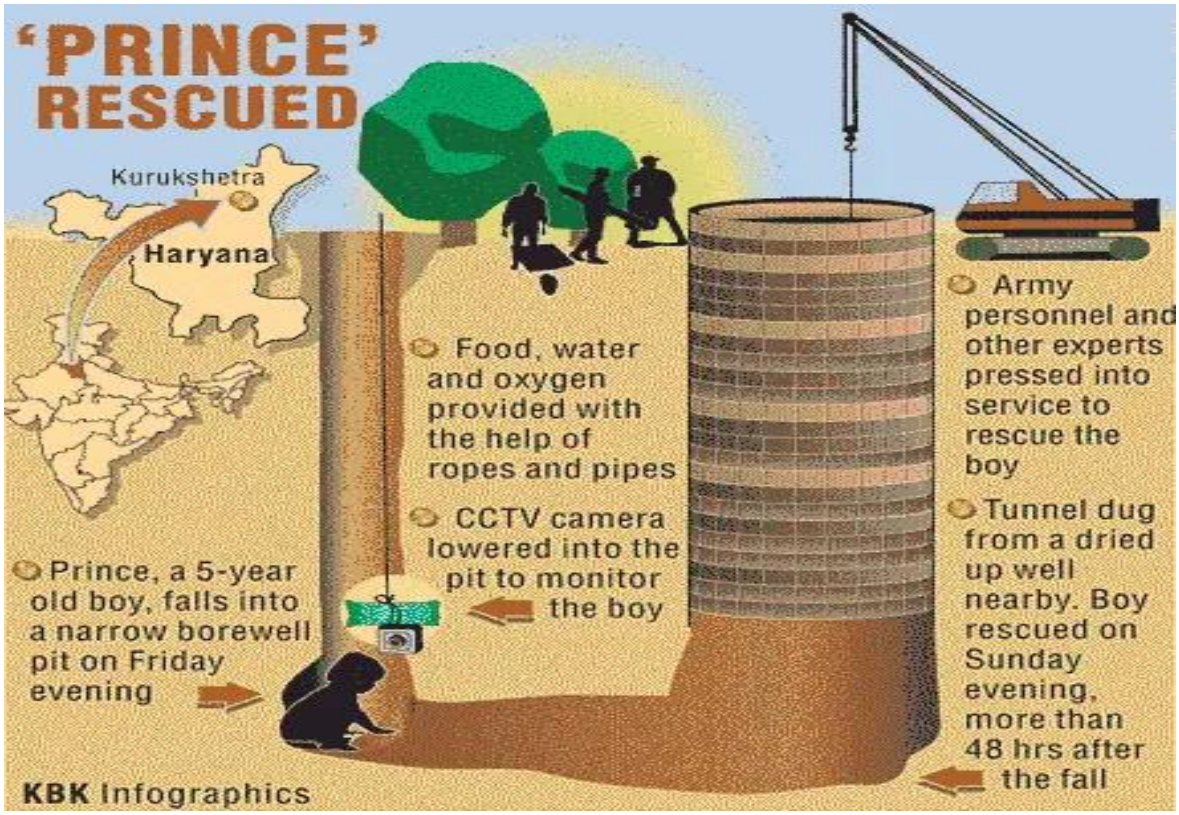


Fig 5.2 Infographics showing rescuing victim "Prince" using parallel hole

This is just suggestion based on the successful operations conducted by NDRF in the past. However, this is not sacrosanct and drilling technique may be adopted as per the ground reality and the depth where victim is trapped. The success of such operations also depends on the nature of soil and rock structure.

5.3 Soil Strata

Soil strata refer to the distinct layers of soil or rock that are found in the earth. These layers, also known as horizons, are formed over time through various geological processes, including the deposition of sediment, weathering of bedrock, and the influence of water and organic matter. Understanding soil strata is important in many fields, including construction, agriculture, environmental science and borewell rescue operations.

Fig 5.3 Layers of soil in a soil Strata

In borewell rescue operations, understanding soil strata (layers of soil and rock) is crucial for safe and effective digging. The type of soil encountered impacts the digging method, slope stability, and potential for cave-ins. For example, loose soil requires more careful excavation and shoring, while hard rock may necessitate specialized drilling equipment.

Here's a breakdown of how soil strata influence rescue operations:

1. Soil Type and Digging:

- **Loose Soil:**

Sandy or silty soil can easily collapse, requiring shoring (like steel plates or wooden supports) to prevent cave-ins.

- **Clayey Soil:**

Clay can be more stable but may also be prone to swelling or shrinking, requiring careful monitoring of moisture levels.

- **Rocky Strata:**

Hard rock may necessitate drilling or blasting, while fractured rock could pose similar stability challenges to loose soil.

- **Combined Layers:**

Often, borewells encounter a mix of soil types. This requires a dynamic approach to rescue, adapting to the changing strata as digging progresses.

2. Slope Stability:

- **Angle of Repose:**

The natural angle at which soil can stand without support depends on its type. Loose soil has a shallow angle, while cohesive soils (like clay) can stand more vertically.

- **Excavation Slope:**

Rescue operations must ensure the angle of the excavated pit's slope is within the stable angle of repose for the specific soil strata.

- **Groundwater:**

Waterlogged soil can significantly reduce stability, making shoring even more critical.

3. Impact on Rescue Techniques:

- **Parallel Pit:**

Digging a parallel pit adjacent to the borewell is a common technique. The depth and angle of this pit are determined by the soil strata.

- **Shoring:**

Depending on the soil, shoring is essential to prevent collapse. Steel plates, wooden supports, or even specialized trench boxes may be used.

- **Drilling:**

If encountering solid rock, specialized drilling equipment is needed to create a channel for rescue.

- **Water Management:**

Pumping out water from the pit is crucial for maintaining stability and visibility. The soil type influences the effectiveness of dewatering efforts.

In essence, understanding the soil strata is vital for:

- Planning the excavation of the rescue pit.
- Selecting appropriate shoring and support systems.
- Choosing the right excavation and drilling methods.
- Managing water levels and maintaining a safe working environment.

****

Lesson No. 06

Care of Children in Borewell:

Objectives:

6.1 Position and condition of Child

6.2 Considering probable rescue time

6.3 Planning for care of Child

6.4 Providing moral support to Victim

6.1 Position and Condition of Victim

In borewell rescue operations, the child's position is crucial for determining the rescue strategy and equipment needed as the posture critically affects the breathing and circulation of the victim; in turn affecting survival rate. If the child is close to the surface, rescuers may attempt a direct extraction or through rope and hooks. If the child is at a greater depth, a parallel bore is dug to reach them, often with the aid of cameras and specialized equipment. The position also dictates the type of rescue apparatus used to safely retrieve the child.

Body posture of victim in the borewell operation

When a victim is trapped in a borewell, their body posture can vary greatly depending on the depth of the fall, the diameter of the well, and any obstacles they encountered on the way down. Video surveillance is used by rescue teams to assess the victim's position and condition in real-time. However, some common postures have been observed in past incidents.

Common victim postures:

- **Upright Position**: Victims often become wedged against the sides of the borewell with their limbs, or they may end up in a crouched or fetal position with their knees bent. This is particularly common for smaller children, as they can get trapped at a narrower point in the well.
- **Fallen Headfirst/Upside Down**: A victim can fall completely and land headfirst, which is a highly dangerous situation. For instance, in a 2024 case in Rajasthan, a five-year-old who fell headfirst died after water got into his windpipe.

- **Immobilized by debris**: Victims can become trapped by stones, mud, or pipes that fall with them or that are already in the borewell. In one case, a child was trapped between old pipes, which complicated the rescue.
- **Submerged in water**. If there is water at the bottom of the borewell, the victim can become submerged, increasing the risk of drowning and hypothermia. Rescue efforts are severely hampered if the water level is high.
- **Stuck Sideways**: A victim may also stuck sideways in the borewell if the opening of the borewell is wide enough and may stuck as the borewell narrows down in the depth.
- **Close to the Surface:** If the child is within a manageable distance from the top of the borewell, rescuers may use ropes, harnesses, or enter the borewell directly to pull the child out if borewell is wide.
- **Deeper Depths:** For deeper incidents, a parallel bore is dug, and a horizontal tunnel is created to connect the two. This allows rescuers to reach the child and extract them safely.
- **Unconscious victim**: In some cases, it has been observed that while extricating unconscious victim, their head or limb stuck with borewell walls as they are not able to control their body.

Rescue operation challenges due to victim's posture:

The victim's posture and condition present significant challenges for rescue teams

- **Difficulty grasping the victim**: Standard rescue methods using hooks or ropes can injure the victim, especially if their posture makes a safe grip difficult. Thermal or Infrared Cameras are increasingly used to carefully clasp the victim's body without causing harm.
- **Limited space**: The narrow, confined space of a borewell restricts the victim's movement and complicates rescue manoeuvres. Rescuers need to use specialized equipment, such as support hooks or inflatable devices, to operate effectively within these constraints.
- **Position adjustments**: In some cases, rescue teams must adjust the victim's posture before extraction. Rescue devices may be equipped with clamps or gripper arms that can rotate and manoeuvre to secure a victim in an ideal position for lifting.
- **Limb Stuck**: In some cases, limbs or body parts of victim get stuck due to narrow walls of borewell. Further, due to injury and bleeding, body naturally

reacts by swelling the injured parts of the body. Rescuers find it hard to pull out the victim, whose body has swollen inside the borewell.

- **Soil fallen on victim**: In many a case, the soil from walls of borewell has fallen on victim during the rescue process. As soil falling continues, the rescuers find it hard to use rescue devices like camera and rescue hook due to obstructed visibility.

Factors Affecting the Child's Condition:

- **Duration of entrapment:** The longer a child is trapped, the higher the risk of dehydration, starvation, and potential injuries.
- **Depth of the borewell:** Deeper borewells pose greater challenges for rescue operations and can lead to more severe injuries.
- **Environmental conditions:** Temperature variations and the presence of toxic gases within the borewell can further endanger the child.
- **Rescue efforts:** Difficult terrain, rocky soil, and the need for parallel pit construction can delay rescue and increase the risk of complications.
- **Underlying medical conditions:** Children with pre-existing health issues may be more vulnerable to the effects of being trapped.
- **Medical attention:** Prompt and effective medical care upon rescue is crucial for maximizing the child's chances of survival and recovery.

Examples from Recent Incidents:

- In Dausa, a 5-year-old boy died after being trapped in a 150-foot borewell for over 55 hours.
- In Kotputli, a 3-year-old girl who was trapped for 10 days in a 700-foot borewell died shortly after being rescued.
- In another incident in Dausa, an NDRF team successfully rescued a child alive from a borewell, highlighting the possibility of successful rescues with timely and efficient operations.

6.2 Considering Probable Rescue Time

In responding in such borewell rescue operation, the “Golden Hour Window” in of utmost importance. **Golden Hour** refers to the concept of an extremely critical, time-sensitive window where a child's chances of survival decrease rapidly as the duration of their confinement in the borewell increases. In a borewell rescue, this "golden hour" signifies that every moment counts because delays in initiating rescue efforts and complexities in the rescue operation significantly reduce the probability of a positive outcome, as seen in the deaths of children in similar incidents, even after lengthy operations.

Calculating the probable rescue time in borewell operations is highly variable and depends on several factors. Traditional methods like digging a parallel pit can take 30 hours or more. The most crucial factor is the time it takes to deploy the rescue equipment and reach the child, which can be affected by ground conditions, the child's location in the well, and the complexity of the rescue environment.

Fig 6.1 Excavators digging during an Borewell Operation

Factors Influencing Rescue Time:

- **Ground Conditions**: Rocky or hard soil can significantly slow down digging for a parallel pit.
- **Depth of the Borewell**: Deeper wells naturally require more time for rescue.
- **Child's Position**: How far down and how accessible the child is will impact the rescue time.

- **Child Condition**: Alert or responsive child are can be evacuated early compared to unconscious child.
- **Rescue Method**: Traditional methods like parallel digging can take 30 hours or more. Automated robotic systems can potentially reduce this time significantly.
- **Availability of Equipment**: Having the right equipment readily available, such as robotic arms, cameras, and oxygen supply systems, is crucial.
- **Team Experience**: Experienced rescue teams with specialized training can operate more efficiently.
- **Response Time**: The time it takes to mobilize the rescue team and get equipment to the site is also a critical factor.
- **Heavy Equipment**: Availability of heavy digging equipment like Piling machine and excavators greatly influence the rescue time.

Reducing operational Response time:

The response time to start borewell rescue operation can be further reduced by:

- **Pre-positioned borewell rescue kits**, are a solution to minimize deaths from children falling into uncovered borewells. These specialized kits featuring cameras, iron hooks, ropes and sensors, are designed to safely retrieve children from deep, narrow borewells in emergency situations. First responders or trained local community can use these specialized kits to start rescue effort till more rescue agencies reach the incident site.
- **Train community and local volunteers**: In collaboration with the State Disaster Response Force (SDRF) or NDRF, communities can establish and train a group of first responders. This training should include: Using basic equipment, Containing the scene, Providing first aid, Establish a communication network and Gather essential equipment.
- **Simulation training for borewell rescue** involves training of rescue agencies like SDRF, NDRF, Fire Services, Volunteers etc; using realistic models to practice retrieving a "victim" from a narrow borewell, focusing on training rescue teams, developing new rescue devices, and educating the public on safety and procedures. Key components include cameras for visual feedback, mechanical grippers for the dummy, and simulated pipe systems to mimic real borewell conditions, providing a safe, controlled environment to enhance effectiveness in actual emergency situations.

6.3 Care of Children in Borewell

In borewell rescue operations involving children, prioritizing the child's safety and well-being is paramount. This includes providing immediate medical attention, ensuring a stable environment within the borewell, and employing careful and methodical rescue techniques to minimize the risk of injury.

Fig 6.2 Rescuer providing milk to the victim in borewell

Some key considerations for caring of child in borewell are:

1. Immediate Medical Assistance:

- First Aid:

Medical personnel preferably Paediatric, should be on standby to provide immediate first aid to the child upon retrieval, addressing any injuries, shock, or other medical needs.

- Monitoring:

Continuous monitoring of the child's vital signs (heart rate, breathing, temperature) is crucial during and after the rescue.

- Psychological Support:

The child may be traumatized by the experience. Psychological support should be provided during and after extrication to help them cope with the situation.

2. Environmental Control:

- Oxygen Supply:

Ensure a consistent supply of oxygen to the child within the borewell, especially if the rescue operation is prolonged.

- Temperature Regulation:

Monitor and maintain a safe temperature within the borewell to prevent hypothermia or overheating.

- Visibility:

Provide adequate lighting and, if possible, a camera to monitor the child's condition and the rescue progress.

- Hydration and Feeding tubes:

If the operation is prolonged and the victim in conscious, rescue team shall keep the victim hydrating and if possible, feed the victim using feeding tubes.

3. Rescue Techniques:

- Minimizing Trauma:

Employ rescue methods that minimize physical stress and potential injury to the child.

- Gripping:

If a mechanical gripper is used, ensure it has a wide surface area and rubber grips to prevent slippage and ensure a secure hold and prevent injury.

- Slow and Steady:

Lift the child slowly and steadily, avoiding sudden movements or jerks that could cause injury.

- Parallel Pit Method:

While digging a parallel pit is a common method, it can be time-consuming and risky. If used, ensure the soil is stable and the digging is done carefully.

- Robotic Systems:

Robotic systems can be used to assess the situation, provide oxygen, and even assist in lifting the child.

4. Coordination and Communication:

- Clear Communication:

Maintain clear and concise communication between all rescue personnel, including those on the surface and those working within the borewell.

- Real-time Monitoring:

Utilize technology like cameras and communication systems to monitor the child's condition and the rescue progress in real-time.

- Coordination:

Ensure all teams involved in the rescue operation are well-coordinated and working towards the common goal of safely retrieving the child.

4. Providing Moral Support to Borewell Victim

In a borewell rescue operation, keeping the child calm and motivated is crucial. Rescue teams use various strategies to maintain the child's morale and cooperation, including providing a sense of safety, reassurance, and a distraction from the stressful situation.

Strategies to Motivate a Child in a Borewell Rescue:

- Reassurance and Calmness:

Rescue personnel maintain a calm and reassuring presence, speaking in soothing tones and offering words of encouragement. They explain the process in simple terms, letting the child know that help is on the way and that they are safe.

- Sensory Stimulation:

Providing sensory stimulation can help distract the child from the fear and discomfort. This could include playing calming music, providing soft toys, or using visual aids like a flashlight to help them see their surroundings.

- Maintaining Physical Comfort:

Ensuring the child is physically comfortable is also important. This could involve providing blankets, keeping them warm, and offering water or snacks if possible.

- Positive Reinforcement:

Offering praise and encouragement for their cooperation can help build their confidence and motivation. Highlighting their bravery and resilience can be very powerful.

- Communication and Connection:

Building a rapport with the child through communication is essential. This involves actively listening to their concerns, validating their feelings, and offering a sense of connection to the outside world.

- Keeping the Parent Involved:

During the rescue operation, parents must be given accurate and truthful updates. Never provide false or misleading information. Be honest about the child's actual condition and status. If possible, involving the parent or guardian in the rescue effort, as parents even through communication, can provide the child with a sense of security and comfort.

- Monitoring and Adjustment:

Continuously monitoring the child's emotional state and adjusting the approach as needed is crucial. What works for one child might not work for another, so flexibility and adaptability are key.

The goal is to create a sense of safety, security, and hope, which can significantly improve the child's ability to cooperate with the rescue efforts and ultimately increase their chances of survival.

- Avoiding media chaos post rescue:

After the rescue, there is often a rush to take photos, which can cause Distress or harm to the child. Efforts should be made to avoid this kind of media frenzy. Ensure a protective perimeter is established around the child, and prioritize sending the child to the hospital safely and quickly along with their family.

****

Chapter - 7

Case Studies

1. Operation "Save Rahul"

Date and time of incident	10/06/2022 at 1600 Hours
Location of incident	Pirdih Village, Block – Malkhorda, Dist – Janjgir Champa, Chattisgarh
Name of Victim	Rahul Sahu
Age and Weight	11 Years/ 31 Kg
Topography of the incident site	The area has ample water resources as the are comes under the Mahanadi River Basin. The incident site was a mix of soft soil and hard rocks.
Diameter of borewell	8 Inch
Depth of borewell	80 Feet
Victim Stuck at	63 Feet
NDRF involved	03 BN NDRF, Mundali.
Nearest NDRF unit/RRC	RRC Bhilai – 275 Kms, 03 Bn Mundali – 480 Kms
Sister agencies	NDRF, District Administration, SDRF, Police, PWD, Medical Team, Mining Team, Army, Home Guards, Fire Brigade, Nagar Sena, South Eastern Coalfield Limited, Bharat Aluminum Company.
Rescue ops called off	15/06/22 at 0030 Hours

Brief Details of the Operation:

The victim 'Rahul" a 11 years old boy fell into 80 feet open and abandoned borewell of 8-inch diameter and got stuck at 63 feet. A rescue team consisting of 32 rescuers from RRC Bhilai, Chattisgarh and Unit HQ, Mundali reached at the incident site at 2351 hrs on the day of incident and started rescue operation. After reaching at the incident site, team commander placed a wooden board on the mouth of the borewell to avoid sand and debris to fall in the borewell.

The rescue team assessed the incident site and condition of the victim and ensured proper supply of oxygen. The victim was a differently abled boy having physical limitations. The team collected more details about the victim's personality. Victim being differently abled was not able to understand the instructions given by the rescue team. The team tried using improvised techniques like J hook, Umbrella tool, Magic ball and Rope knot, but any of the method could not succeed for the time being.

The borewell, at the bottom had a 2-3 feet cavity. As the team tried to extricate the victim by lowering rescue tools, the victim used to hide in the cavity. Parallel digging by heavy earthmoving equipment was started simultaneously. The victim was given fruits, juice and ORS solution ko keep himself hydrated and whole situation was

monitored through the camera. To encourage the victim, family members of the victim were roped in to talk and assure the victim.

On 13/06/22, as parallel digging continued, team encountered a hard boulder at a depth of 58 feet. Core cutting machine was utilized to break the rock but the machine got a mechanical fault after 3 hours. The rescue team manually chipped the rock using chipping hammer. Due to manual chipping, the speed of rescue operation was slowed down. A wagon drill machine was also pressed in operation, but it could not work as this machine is used for horizontal drilling.

On 14/06/22, NDRF rescue team was able to break 18 feet of hard rock and managed to reach the borewell. Team made hard efforts to pull out a 2-3 feet wide and heavy rock using ropes to locate the victim. At 2315 hours on 14/06/22, team members along with a skinny/lean laborer went inside the cramped tunnel and extricated the victim using bedsheet and rope as harness. The operation went on for 104 hours continuously and resulted in successful evacuation of the victim. The victim was sent to hospital for further medical attention.

Challenges faced:

- The differently able condition of victim made the operation challenging.
- The borewell was a kutcha borewell and the sand was falling into the borewell while rescue was in progress
- Borewell has no casing pipe
- Hard rock at 58 feet slowed the operation
- Rock breaker machine could not work efficiently
- The tunnel made to extricate the victim was narrow and cramped for the rescuers to work efficiently.
- Lack of fresh air and excessive humidity in the tunnel
- Vibration of the heavy earthmoving equipment poses a danger as kutcha borewell may collapse due to vibrations.
- Rescuers had to work is harsh and challenging environment
- Limitations of improvised equipment.

Lesson learnt:

- Every borewell operation poses unique challenges and rescuers have to apply their ingenuity accordingly.
- For a successful rescue evacuation, dedicated work along with coordination of other rescue agencies is on paramount importance.
- Such rescue operation proves a guiding light for learnings that can be applied in future operations.
- Use of proper equipment at proper time sets the direction of the rescue operation.

****

2. Operation "Sujith Wilson"

Date and time of incident	25.10.19
Location of incident	Nadukattupatti village, Manapparai, Tiruchirappalli, TN
Name of Victim	Sujith Wilson
Age	2 Years
Topography of the incident site	It was noticed that the area of the Bore well was of igneous rock from an estimated depth of 5 feet to 55 feet depth.
Diameter of borewell	-
Depth of borewell	-
Victim Stuck at	88 Feet
NDRF involved	04 BN NDRF, Arrakonam, Tamilnadu.
Nearest NDRF unit/RRC	04 BN NDRF – 360 Kms
Sister agencies	NDRF, Tamil Nadu Police, the State Fire and Rescue Department District Police, Local Bore well rescue Experts Mr Manikandan of Madurai, Mr Daniel from Trichy, Mr Sridhar from Coimbatore and Dr Venkatesh from Palladam, Tamilnadu Disaster Response Force
Rescue ops called off	29.10.19 at about 0445 Hrs.

Brief Details of the Operation:

Two-year-old boy, Sujith Wilson accidently fell into an unused bore well in an agricultural field belonging to his father while playing on 25/10/2019. After the incident, as a district level response, Tamil Nadu Police, the State Fire and Rescue Department, District Police, Local Bore well rescue experts reached the spot and started

rescue operation. They were soon assisted by a team from Tamilnadu Disaster Response Force who reported shortly after. Victim reportedly trapped initially at a depth of about 30 feet, when the rescue operations were launched by the first responders.

On 26th October 2019 at about 03:49 Hrs, a telephonic request for deployment of one team of NDRF was received from Government of Tamil Nadu. Control Room of the 4th BN obtained all information and a team consisting of 40 personnel left 4th BN NDRF Arakkonam and reached the incident site location on same day at about 10:45 HRS. On arriving at Incident site, the team immediately established the Base of Operation and secured the scene as per the standard operating procedure.

The team further consulted with District Collector Trichy, Superintendent of Police Trichy, DGP Fire and Rescue Services and gathered required information regarding the initial efforts, their directions and their rescue plans. Team Commander NDRF assessed the situation /condition of the boy with Borewell Inspection Camera. It was established that the child was stuck at a depth of 88 feet. Initial check and information showed that child had reportedly not been heard moving or making any noise for over last 12 hours. The problem was further exacerbated by the fact that the victim was covered with soil. Only a little part of fingers was visible and which was insufficient to attach any rescue device.

Based on the situation at the incident site, it was decided that a vertical tunnel would be dug to the depth at which the child was stuck. A horizontal tunnel would then be manually drilled to reach up to the victim. To stabilize the boy through anchoring one device developed by a Trichy based bore well rescue expert was used and partially anchored the boy at 88 feet. This method was undertaken as there was less likelihood of success by employing manual rescue methods like Rope rescue, cradle or winching or robotic grip etc to extricate the victim.

Review Meetings were also conducted on 26/10/2019 and rig machines were requisitioned by the state administration from L&T construction company, and the experts of mine and geology of ONGC, Lignite Corporation Ltd. Neyveli, also joined the operation.

On 27th Oct'2019, as discussed with Incident commander and technical experts from NLC, ONGC, L&T, digging of a parallel (1.2-meter width) tunnel was continued at a distance of 6 to 7 feet away from main bore well by L&T team but it was noticed that the area of the tunnelling was of igneous rock from an estimated depth of 5 feet to 55 feet depth. Geologists who were consulted pointed out that the soil comprised of hard rock of quartz and feldspar. Due to which, up to the midnight of 28th Oct'19, only 40 feet digging could be done.

On 28th Oct'2019 midnight, during rescue operation in the borewell, the rescuers noticed foul smell from the borewell and the same was intimated to the Incident commander. After receiving the opinion from the medical team who were present the

operation site it was assessed that the body of the child has been highly decomposed / dead.

After that, on 29th Oct'2019 at about 02:45 AM, mortal remains of child which were highly decomposed were recovered. The entire operation was carried out by Tamilnadu Fire and Rescue services department, Tamilnadu State Disaster Response Force, Tamilnadu Police and NDRF in close coordination.

Challenges faced:

- The diameter of abandoned Borewell was very narrow
- Presence of hard igneous rock like quartz and feldspar delayed the speed of the rescue operation
- A key challenge was maintaining the speed of the drilling since there were chances of the Borewell collapsing due to vibrations of heavy machinery.
- Only fingers of the victim very visible from above which were not sufficient enough to use rescue equipment.
- Rescuers had to work hard in challenging environment as operation ran for multiple days.

Lessons Learned:

- Close coordination among rescue agencies is essential for such rescue operations.
- Borewell rescue operation poses multiple challenges which need to tackled with inter agency coordination.

****

3. Operation "Ravi"

Date and time of incident	20/02/2019 at 1630 hrs.
Location of incident	Jadhavwadi Village, Tehsil – Ambegaon, Pune
Name of Victim	Ravi Pandit Bhil
Age	6 Years
Topography of the incident site	A mix of soft soil on the surface and hard rocks in shallow depths.
Diameter of borewell	-
Depth of borewell	300 Feet
Victim Stuck at	10 Feet
NDRF involved	05 BN NDRF, Pune
Nearest NDRF unit/RRC	05 BN NDRF – 77 Kms
Sister agencies	District Administration, Police
Rescue ops called off	21/02/19 at about 0900 Hrs.

Brief of the Incident:

A 6-year-old boy named Ravi Pandit Bhil fell into an open borewell on 20/02/19 at 1630 hours in Jadhavwadi village of Pune, Maharastra. The depth of the borewell was 300 feet and the victim was stuck at a shallow depth of 10 feet only. 5 BN NDRF situated at Sudumbre, Pune received a call at 1730 hours on the same day from Tehsildar, Ambegaon regarding the incident. Alert Rescue team of NDRF left for the incident site at 1740 hours. Team reached at the incident site at 1955 hours and took charge of the operation.

Before reaching the incident site, based on the previous experiences, the NDRF team asked the district administration to provide oxygen rich environment to the child using oxygen cylinders and supply pipes. It was also told to start digging a parallel hole at a safe distance from the main borewell and to secure the child by tying ropes on victim's hands if visible. While team was on the move, instructions were also passed to ensure the following: that no sand falls in the borewell, presence of medical trauma management team at the incident site, illumination of the incident site for the night operations and access to rescue agencies only.

When NDRF team reached at the incident site, locals have already dug a 3 feet wide hole at a 2 feet distance from the main borewell. During digging, some sand and debris had fallen in the borewell. The locals to remove the fallen sand had poured water which further solidified the sand around the waist of the victim in the borewell. The victim was visible and communicating with the team.

The victim was alert and responding to verbal communication. After assessing the situation at the incident site and type of soil, team decided to excavate a parallel hole near the main borewell. During the process, the team was providing emotional support and counselling to the victim while simultaneously ensuring that no further injury is caused to the victim during rescue process.

After digging 4 feet, hard rocky soil appeared, which was hard to excavate using the available excavator. Team decided to dig vertically using CSSR tools and then make a horizontal tunnel to reach the victim. Hard rock and manual digging with hand tools slowed the pace of the operation. After digging up to 8 and 10 feet, the team tried to pull out the victim by holding his arms but both times the team could not succeed as the victim was stuck in debris and mud.

Team offered ORS solution, water and eatables to the victim to keep him hydrated. Team again dug till 12 feet and tried to pull out the victim but again team was not able to extricate the victim. At this point, team used a seat harness to ease pressure on victim's limbs. At last, team dug till 14 feet and cleared the sand and mud around the waist of the victim. At 0900 hours on 21/02/2019, the victim was safely extricated from the borewell and sent for further medical treatment.

Challenges Faced:

- Before arrival of the team at incident site, locals had dug a parallel hole very near to the main borewell. During this process, sand and debris fell into the borewell over victim's head.
- To remove fallen sand from victim head, locals poured some water, which further solidified the sand around the victim's waist. Team has to struggle hard to remove that solidified sand and extricate the victim.
- The topography of the incident site was very challenging. The hard rock started after 4 feet only. Cutting through the hard rock took major time of the operation.
- With passing of time, there were chances of developing compartment syndrome in the victim.
- There was no space around the waist of the victim to deploy any rescue equipment. Team was left with limited choices in this situation.

Lessons Learnt:

- Team tried to pull out the victim after digging up to 8, 10 and 12 feet, which consumed a lot of time. Had the team dug up to 14 feet at once, rescue could have been quicker.
- Every borewell operation poses unique challenges and requires out of the box and critical thinking.

- Patience, empathy and emotional intelligence are key soft skill that every rescuer must practice in such operations.

****

4. Operation "Ritik"

Date and time of incident	22/05/2022 at 0945 hrs.
Location of incident	Vill- Khaiyala Bulanda, Distt – Hoshiarpur, Punjab
Name of Victim	Ritik
Age	6 Years
Topography of the incident site	Hoshiarpur is generally characterized by undulating terrain with a mix of plains and low hills. The region features agricultural fields, small water bodies, and scattered settlements.
Diameter of borewell	9 Inches
Depth of borewell	300 Feet
Victim Stuck at	90 Feet
NDRF involved	07 BN NDRF, Bhatinda
Nearest NDRF unit/RRC	RRC Nurpur – 72 Kms, BHQ Bhatinda – 248 Kms
Sister agencies	District Administration, Police, NGOs Dera Saccha Sauda & Baba Deep Singh Seva Dal, Welfare society, Dett. of Army Engineers and Ordinance and Civil volunteers
Rescue ops called off	22/05/2022 at 1800 Hours

Brief Details of the incident:

The incident took place in Khyala village of Hoshiarpur. According to requisition, the victim was playing in a field where a few stray dogs started chasing him, he climbed over borewell shaft which was covered with a jute bag, which could not bear the victim's weight and gave way, due to which the boy fell inside the borewell and got stuck at approx. at 90 ft depth.

On 22-05-2022, a telephonic requisition received from District administration Hoshiarpur (PB), regarding assistance for rescue of 01 victim (Name Ritik, S/O Raju, Aged 06 years) who fell inside 300 ft deep borewell (with 09-inch diameter) in Vill-Khaiyala, Bulanda, Hoshiarpur (PB) and got stuck at approx. 90 feet. A total strength of 46 rescuers from multiple locations of the unit were deployed at incident site and started rescue ops along with Civil Administration. After arrival at incident site, teams coordinated with civil administration, local rescue agencies and started rescue Ops. NDRF team conducted a thorough assessment of the situation and gathered information about depth, condition & other relevant factors that may impact the rescue operation

Initially, the C-Hook method was used to check whether rope could be noosed around the hands of stuck victim. Multipurpose rope was lowered into the borewell with help of an improvised hook. Civil volunteers and rescuers of 7 NDRF secured the rope around the hands of stuck victim and pulled him out from the borewell. After strenuous effort of teams, victim was retrieved at 221800 hrs in unconscious state and sent to hospital for further medical treatment by civil doctors placed at incident site by district administration. Later victim was declared dead by Civil Hospital.

Challenges Faced:

- Huge crowd had gathered at incident site.

Lessons Learnt:

- Being a very sensitive and technical operation, Officer-in- Charge, team Commander should always work in close co-ordination with the incident commander/ senior most civil administrator present at site.
- Continuous training and exposure to equipment build confidence in rescuers and prepared them to operate in live operations.
- Regular practice and demonstrations also help in save precious time during ops.

****

5. Operation "Satvik"

Date and time of incident	03/04/24 at 1830 hrs.
Location of incident	Lachyan Village, Vijayapura district, Karnataka
Name of Victim	Satvik
Age	2 Years
Topography of the incident site	District - Vijayapura has two types of soil. First one is, "deep black soil" which is good for the crops like Jawar, Wheat, Pulses and sunflower. The major portion of the district consists of this kind of soil which has a great moisture-holding capacity. Second one is "red soil" which is generally poor, good for irrigation and horticulture
Diameter of borewell	8.5 Inches
Depth of borewell	260 Feet
Victim Stuck at	20 Feet
NDRF involved	10 BN NDRF, Vijaywada, AP
Nearest NDRF unit/RRC	RRC Hyderabad – 365 Kms
Sister agencies	District Administration, Police, SDRF, Fire Department and Revenue Department
Rescue ops called off	05/04/24 at 1430 Hours

Brief Details of the incident:

On 03.04.2024, an information was displayed in TV9 Kannada that a two-year-old boy fell into an open borewell in Lachyan, Vijayapura (KA). The Vijayapura police control room later confirmed that the victim had fallen into the borewell on the evening at approximately 1800 hours. The fire department and local police were actively working at the scene where the victim was trapped at a depth of 18-20 feet.

The victim was stabilized using a rope loop. Personnel from the health department had initiated oxygen supply, and the CCTV camera feed confirms that the victim was alive

and responsive. The victim was trapped upside down in the borewell with only the victim's feet visible through the CCTV camera. District Collector, Vijayapura Distt. (KA) telephonically requested NDRF to deploy one team for the rescue operation. On receipt of the requisition, alert team consisting of 20 rescuers from RRC HYD was activated for Bore well rescue operation.

When the NDRF arrived at the site, SDRF team was already on the ground, collaborating with other departments. Digging of a parallel pit using heavy machinery was in process. Upon reaching the incident location, the NDRF Commander assessed the situation along with the incident commander. Subsequently, the NDRF team initiated the rescue operation using improvised borewell rescue equipment.

A CCTV camera was employed to pinpoint the child's location within the borewell. After analysing the live video feed, the team determined that the child was trapped at a depth of 18 feet, wedged between a large rock, as that section of the borewell had been drilled through hard black rock. The team commander then advised halting the excavation with the JCB, as it was felt that vibrations due to heavy equipment use might compromise the integrity of the borewell. This measure was taken to stabilize the victim properly before proceeding with operations.

After stabilizing the victim with the ropes, the digging process was continued. Upon reaching a depth of 22 feet, the digging team began creating a horizontal tunnel to access the main borewell. The NDRF team employed a jackhammer (pneumatic drill) for this task. The team drilled through the hard rock for approximately 8 feet to reach the borewell line beneath the trapped victim.

The team cleared debris from the borewell and utilized vacuum cleaners to remove dust. During the excavation, it was discovered that the victim's hips were trapped on the rock, while the head was visible. The team commander promptly directed the rescuers to use a medium chipping hammer and other small digging tools to create a small gap between the child and the rock. They covered the victim with cloth to protect him from potential injuries caused by drilling debris. Additionally, the team placed a concrete slab balanced on two iron pipes in the centre of the hole to prevent the child from slipping further down the borewell.

After creating space between the victim and the rock, the NDRF team cautiously pulled the victim out, wrapped him in a cloth, and cleared his eyes and nose to ensure smooth breathing and clear sight. After successful extrication, the victim was handed over to medical authorities for further care.

Challenges faced:

- Unpredictable scorching heat
- Faced difficulty digging in black rock
- Huge crowd had gathered at incident site

Lessons Learnt:

- Rescuers have to be mentally and physically prepared to relentlessly work in harsh environmental conditions.

- Rescuers faced a rescue operation where victim is stuck upside down and learned rescue methodology in such cases.

****

Bibliography:

1. "Killer borewells: Recent cases of children falling into deadly holes". The Economic Times. 29 July 2022. Retrieved 29 December 2024.
2. Get tougher laws to stop borewell deaths". The New Indian Express. 22 December 2024. Retrieved 29 December 2024.
3. Document: Dynamic groundwater resources of India by Central Ground Water Board, Ministry of Water Resources.
4.https://sansad.in/getFile/loksabhaquestions/annex/184/AU2507_WRAC7x.pdf?source=pqals
5. https://cgwa-noc.gov.in/landingpage/LatestUpdate
6. https://nwm.gov.in/sites/default/files/waterwiki/9.pdf
7. https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=99289
8. Standard Operating Procedure on Borewell incident Response – NDRF India
9. Fatal Accidents of Children Falling into Abandoned Borewells: An 11-Year - Review of Data and Literature
10. study carried out in the department of forensic medicine and toxicology, Indira Gandhi government Medical College, Nagpur
11. https://timesofindia.indiatimes.com/city/agra/farrukhabad-58-hours-later-rescue-operation-called-off-to-save-trapped-seema-in-60-feet-borewell/articleshow/68751188.cms#:~:text=AGRA:%20More%20than%2058%20hours,well%20as%20for%20neighbouring%20houses.