PUNJ LLOYD update

Accomplished a plethora of complicated engineering and construction activities

After stiff international competition, Punj Lloyd was awarded in December 2001, an EPC contract for the Sour Water Stripper (SWS), Amine Treater Unit (ATU), Amine Recovery Unit (ARU), Sulphur Recovery Unit (SRU) and Vizbreaker Unit (VBU) at the Manali refinery of Chennai Petroleum Corporation (CPCL). It was part of a wider expansion plan, which included the establishment of several units and facilities. The capacity of the VBU to be constructed at the site was 3600 MT/ Std. day and the Sulphur Block comprising the SRU, SWS Unit 1, SWS Unit 2 and ATU and ARU were required to have 180 MT/day (two trains), 45.5 MT/hr, 13.4 MT/hr and 330 MT/hr capacities, respectively.

The project had to be completed within a challenging timeframe of 19 months. But, true to our tradition, we completed it before schedule. The VBU was commissioned in April 2004 and the commissioning of the SRU Block took place in August 2004.

The construction of the Visbreaker Unit including a Fired Heater Unit was one of our major achievements at this site. 6.34 million man-hours were spent on EPC services and project management. Our client appreciated the

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successful completion of 80% of engineering work within the first eight months of the timeframe.

The procurement aspect of a project of this magnitude posed the toughest logistical challenge. We procured 350 varied types of mechanical equipment, 130 km length of pipes, 83,000 pipe fittings, 34,300 flanges, 19,650 valves and 496 km length of cables, transformers, HT&LT switchgears and instrumentation items from vendors spread across India, Europe and America. Third party inspection was carried out to ensure the quality of items. A task force was deployed to monitor the progress of the project and handle supply chain management ensuring timely completion of the project.

Another challenge was to accomplish a plethora of complicated engineering and construction activities within a relatively small area of 16,056 m^2. To overcome space constraints, steel structures and pipes were fabricated outside the refinery premises. Moreover, the assembly, welding and hydrotesting of VBU's Fractionator in a vertical position was yet another remarkable engineering activity, as it was delivered at the project site in two parts to facilitate transportation.

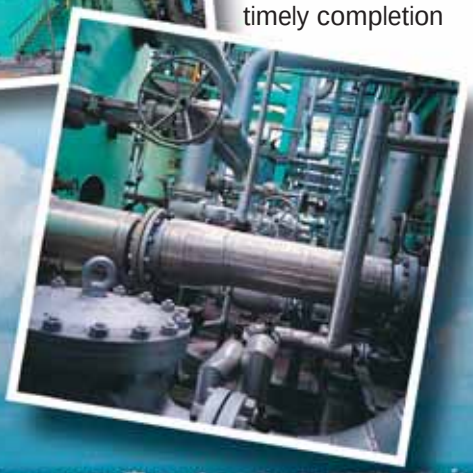
In keeping with our corporate policy, Health, Safety and Environment (HSE) were of paramount concern at site. The use of a manlift was compulsory at high elevations. We received two Safety Awards on the completion of one million and two million man-hours without lost time injury. Safety drills were regularly conducted at site to educate the staff and workers on various safety aspects. Two workers were rewarded every month for excellence in the field of HSE.

Thus, the project was completed successfully with the efforts of our team.

◆ P Vasudevan

scope of work

Residual process design, detailed engineering, procurement, supply, transportation, storage, fabrication, construction, installation, testing, pre-commissioning, commissioning and performance guarantee.



Community Development Initiatives

Punj Lloyd takes its role as a responsible corporate citizen very seriously. The concept of community development is an integral part of our construction projects. Social and economic involvement of the local people at the project site is as important for the company as the on schedule completion of projects. This is visible at all project sites, where we have created not only massive concrete and metal marvels, but also initiated several community development ventures to benefit the local population.

Indonesia

PT Punj Lloyd Indonesia (PT PLI), in line with corporate policy, organised a health and environment awareness programme for school children at our Samarinda base camp. This was attended by the school principal, teachers and all students. The programme provided the opportunity to create environmental awareness and to inculcate good health and hygiene practices.

The focus was on health, hygiene and environment. The children were apprised of insect bites, poisonous gases, health hazards of radiation and how to avoid them. The importance of a healthy lifestyle and regular medical check ups were emphasised. We organise regular health camps for villagers along the ROW.

India

In Belgaum, Karnataka, Punj Lloyd built four tennis courts of international standard with bituminous surfaces for an international tennis tournament to be held in October 2004. We also constructed two greens for an 18-hole golf course.

In the area of rural development, we helped the inhabitants of Khanapur village and Sankeshwar town by adding civic amenities, widening roads, repairing the drainage system in the local market area, renovating their old religious structures and improving sports grounds. This created a significant number of jobs for the local people. As the availability of water is scarce in this part of Karnataka during the summer, we ensured water supply through tankers.

Practical training to graduate and postgraduate engineering students of several colleges of Karnataka was also provided. Study tours to our project sites for five teams of engineering students were arranged to enhance their practical expertise.

Through a need based selection process, we provided construction material to a large number of Project Affected People (PAP) to enable them to construct homes and financial assistance was extended to facilitate their resettlement with the least amount of inconvenience.

◆ Sanjay Kakra and Akhil Gupta

Pipeline of the Century

The prestigious 1760 km long pipeline, which will carry crude oil from the Caspian Sea to the Mediterranean Sea, is referred to as the 'Pipeline of the Century.' It is a matter of great honour for Punj Lloyd to be a part of this project. Owned by the BTC (Baku-Tbilisi-Ceyhan) Co., a consortium of 12 oil companies including British Petroleum, the pipeline passes through three countries - Azerbaijan, Georgia

and Turkey. Punj Lloyd-Limak JV (a joint venture between Punj Lloyd and Limak Construction, Turkey) was awarded the Turkish section of the Baku-Tbilisi-Ceyhan pipeline project to construct 207.5 km (42”dia) and 124.8 km (34”dia) from pumping station No. 4 near Sivas to the tank terminal at Ceyhan on the Mediterranean Sea. This is referred to as LOT-C, and covers a total length of 332 km. Presently, we have achieved 85% completion.

In addition, based on our safe record, Punj Lloyd are also laying 53 km (each of 42” and 46” dia) of the Georgian section of this pipeline and the South Caucasian Pipeline. This twin pipeline extends from Bakuriani to the Georgian and Turkish border.

Engineering Achievements

LOT-C was awarded to Punj Lloyd-Limak JV in September 2002. The scope of work includes the EPC for the pipeline, 13 block valve stations and pre-commissioning. The project completion date is May 2005.

LOT-C passes through the toughest geographical section of the whole project. The pipeline passes through the Taurus mountain range and the high ground water area of Cukurova plains. It passes through steep slopes, ecologically sensitive areas (ESA) and the Cokak Geographical Fault. 85% of the pipeline section is in the slopes, ESA, high elevation and rocky areas.

To continue construction in these precarious slopes at dangerous heights, we had to adopt several special measures. Special training was imparted to all the team members and they were allowed to work on these sites only on the successful completion of this training. All the equipment operating on these slopes had to be anchored from the top to prevent their fall down the slopes. Barbed fencing and retaining walls were raised to protect the earthwork from sliding.

Along the total length of the pipeline, we have established a main camp at Kosreli and four mobile camps at Andirin, Goksun, Yesilkent and Orenshire, with living

and working facilities of international standards. During the construction engineering phase, a team of experts and engineers was mobilised. These included plans, procedures, method statements of health, safety and environment and construction disciplines.

We have mobilised more than 2450 personnel from ten countries and one of the largest fleet of equipment for this project. We have recorded 4.2 million working hours without a day away from work cases (total 7 million working hours without any fatality of project personnel) and travelled more than 15 million km at site.

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BAKU-TBILISI-CEYHAN CRUDE OIL PIPELINE PROJECT

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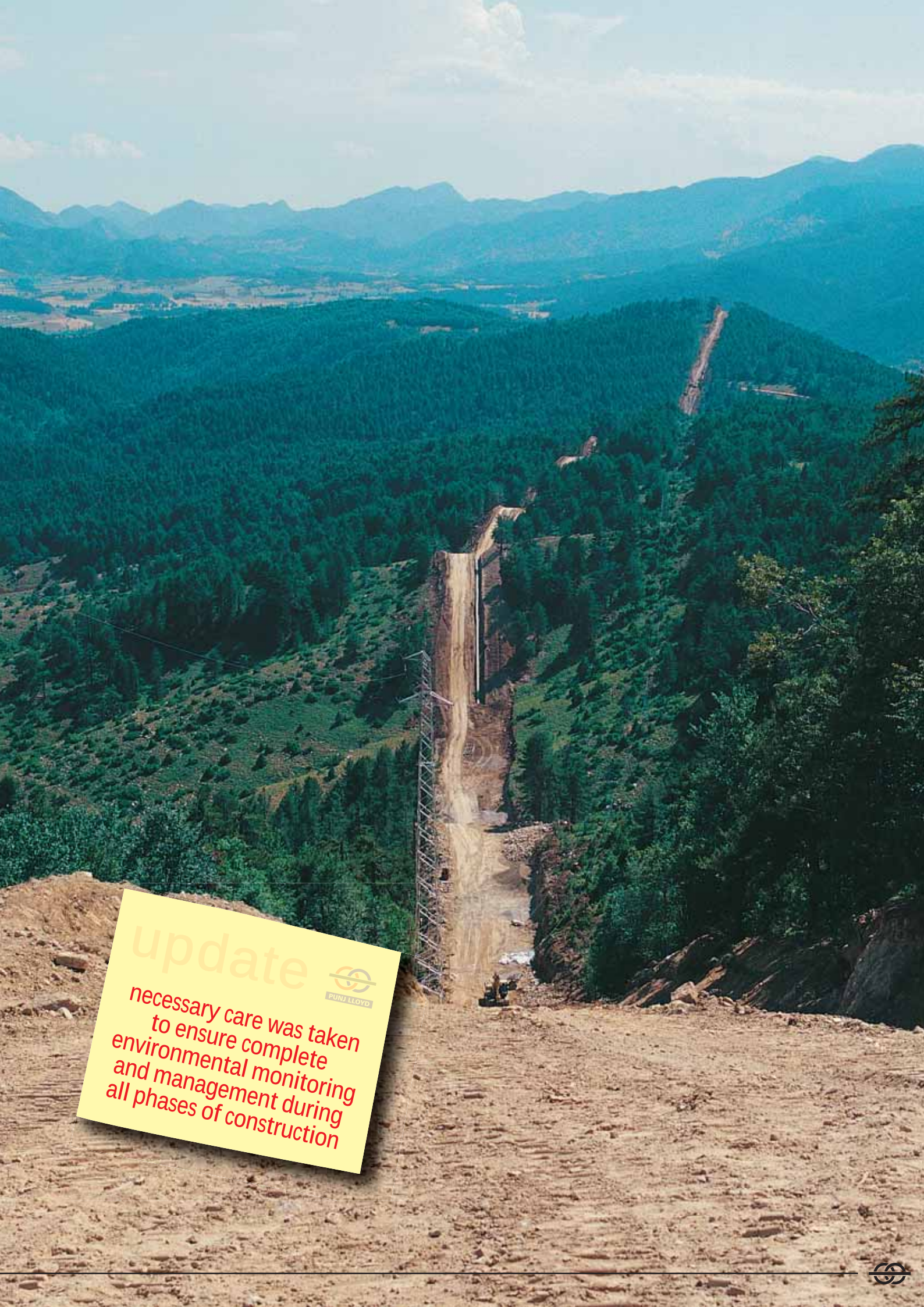
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Environmental Monitoring and Management

As social and environmental aspects are paramount to us, the team took all necessary care to ensure complete environmental monitoring and management during all phases of the project - before, during and after construction. In an audit conducted between June and July 2004 at site and all camps, we have been awarded 5 stars by the British Safety Council. This project has also been certified by Det Norske Veritas for OHSAS 18001, ISO 14001 and ISO 9001.


Five Star Health and Safety Management Audit System

This is to certify that

PUNJ LLOYD-LIMAK JOINT VENTURE BTC CRUDE OIL PIPELINE PROJECT-LOT C, TURKEY

after an extensive evaluation by an auditor accredited by the British Safety Council, has been awarded a rating of Five Stars.

Community Development and Archaeological Considerations

Our programs are aimed at enhancing the lives of the communities with whom we interacted along the ROW. We have used 180 access roads to divert the villages from the construction site and to ensure that their daily routine is not disrupted in any way. Aditionally, we have repaired existing village roads and water channels for irrigation in several villages along our ROW. Traffic control marshals called “Banksmen” were employed at all major roads along the ROW. In line with our corporate policy, we hired all our unskilled workers from villagers within 50 km of our pipeline route.

Priority for recruitment was also given to the local community for skilled, semi-skilled and handicapped personnel, thereby generating employment, training and providing job prospects to a large section of the local population along the ROW this necessitated rigorous training in HSE and construction activities for the local recruits. To encouraged Turkish vendors, we ensured our supplies

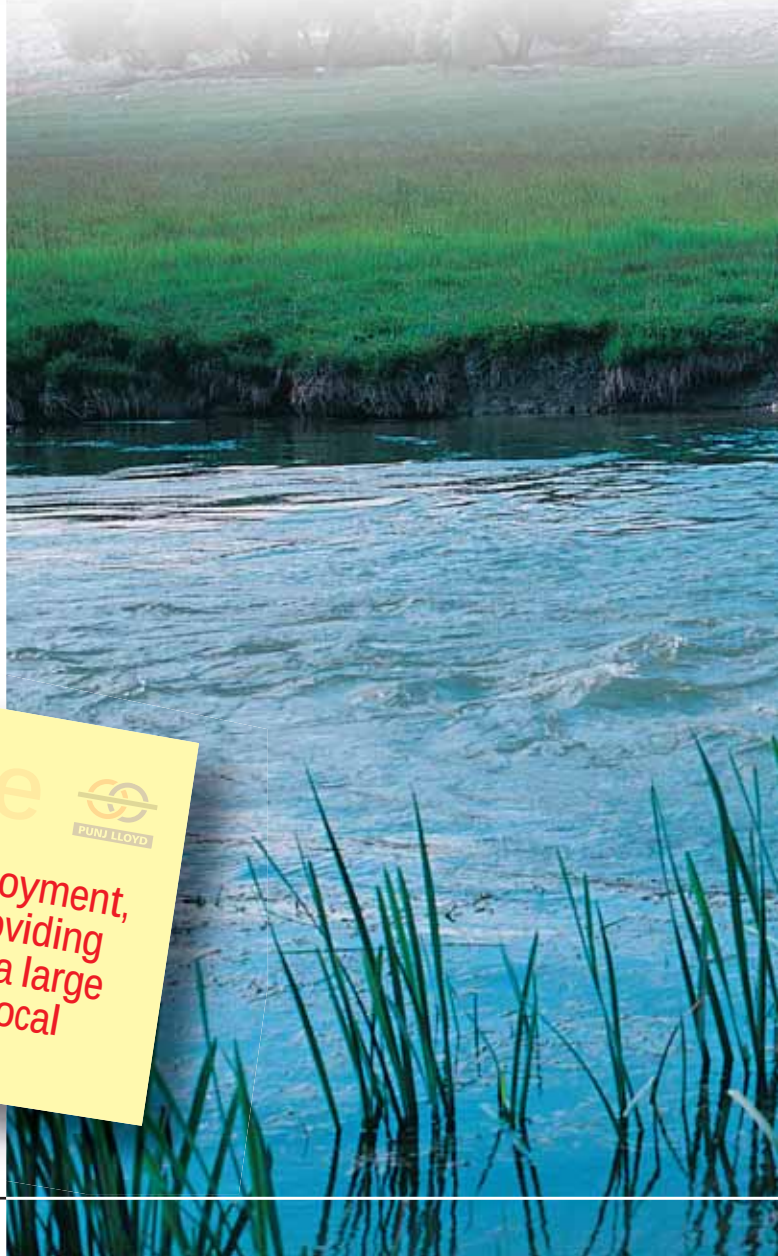
were procured locally. Turkish sub-contractors were developed by us as a demonstration of our commitment to maximise local resources.

An extremely interesting aspect of this project is the discovery of archaeological sites while laying the pipeline. The team of Punj Lloyd archaeologists have unearthed a Roman bath along the ROW near Geben village, Turkey.

Restoration of River Zamanti

The Zamanti River, along with its 600 m flood plain, is the natural habitat of a wide variety of plant and animal life, including the Eurasian otter. It is well known for its bio-diversity and fragile eco-system. This river and its flood plain act as the transit point for migratory sea birds and breeding site for rare species of aquatic plants (April-July); migrating fish-eel (September-December); and breeding fish (December-February).

During the implementation of this project, one of the special



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achievements of our environmental team was the successful restoration of River Zamanti and its 600 m flood plain. For this purpose, we appointed a number of specialists to form the environmental team.

We had to work within seasonal constraints. The only months available for construction activities on the bank of Zamanti were March and August. The environmental team was involved from the planning stage to the personal supervision of construction at this important location. It ensured minimal damage to the ROW, its topsoil and enabled the successful restoration of the river crossing and its flood plain.

The segregation of threatened and rare plant species along the ROW and the Zamanti riverbank was done according to the International Union of Conservation of Nature (IUCN) guidelines and the Turkish Red Data Book

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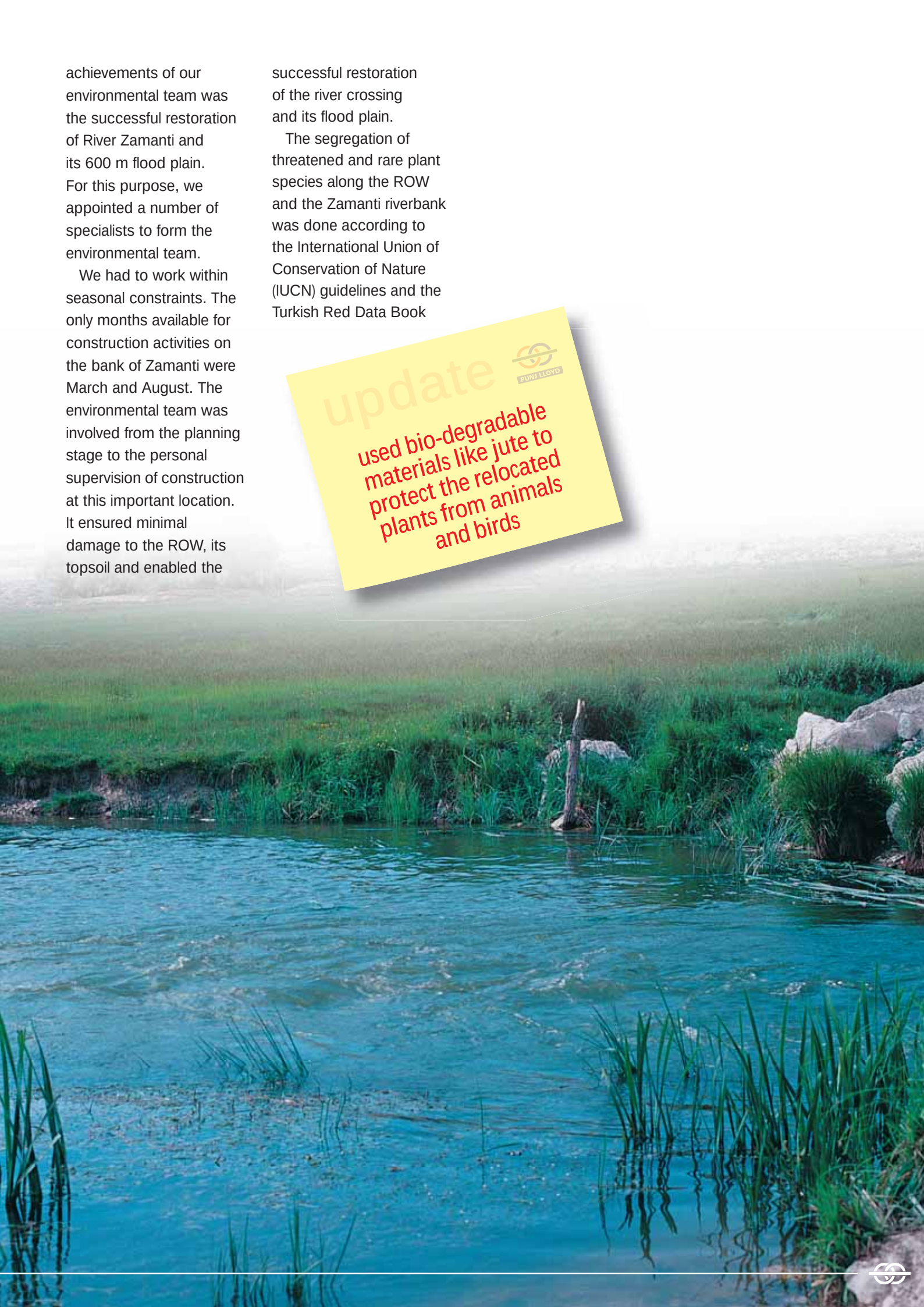

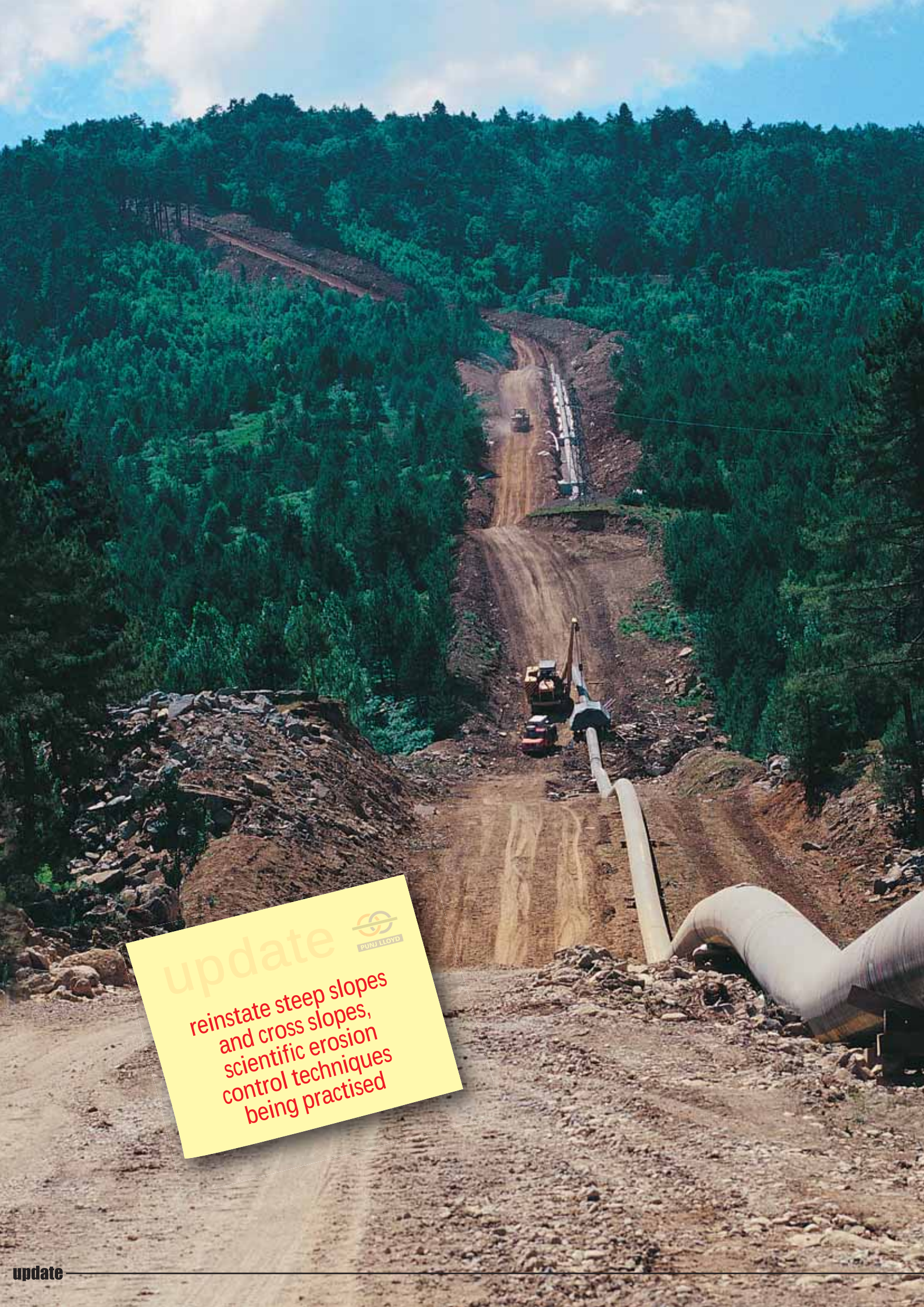
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specifications. We used bio-degradable materials like jute to protect the relocated plants from animals and birds.

Construction innovation for Zamanti included the installation of wooden log mats over a geo-textile layer to protect the topsoil, which was not removed in this location to gain extra bearing capacity and to minimise the direct impact of equipment movement on topsoil. Reinstatement of ROW included successful re-positioning of topsoil, re-contouring the area, ensuring re-growth of the floral species, implementation of gabions for riverbank protection, reinstating the small water channels and tributaries, and achieving minimal construction scars.

Use of Scientific Approach for Protecting the Environment

One of the remarkable aspects of this project is the use of scientific tools to plan and demarcate environmental activities from each other, the most significant being the application of the Universal Soil Loss Equation (USLE) for identifying the erosion potential of the slopes.

Reinstatement and bio-restoration

Punj Lloyd-Limak JV is passionately committed to bio-restoration. For this, our ecological and agricultural experts conducted detailed tree enumeration and shrub

density estimation during the staking survey. A database is prepared for the number of trees and species to be planted. The local nurseries and the Ministry of Environment and Forest are contacted for offset planting requirements. They supply some seeds and saplings, which are carefully grown and nurtured in green houses till they are relocated on the ROW.

To reinstate steep slopes and cross slopes, scientific erosion control techniques are being practised by Punj Lloyd-Limak JV. Measures include slope breakers, jute matting, hydro seeding or germinating some species of plants in water. These are applied in various combinations integrated with the bio-restoration requirements, depending on the site conditions. Since this site involves working in seismic zones, many special measures are being adopted.

A length of 52 km in our ROW will need bio-restoration activities to be carried out. This is significantly longer than most other projects.

◆ Atul Jain and K K Saha

Meeting the Targets Motor Spirit Quality Upgradation Plant, Haldia

The EPC project for Motor Spirit Quality (MSQ) upgradation at the Haldia Refinery site was awarded to Punj Lloyd in January 2004 by the Indian Oil Corporation. The process technology utilised in this project was licensed from Axens, IFP Group Technologies, France who provided the basic process package for this plant. Lurgi India is the Project Management Consultant. Blended Motor Spirit from this plant will be distributed in Eastern India, where it will play a crucial role in meeting Euro III norms. The project has to be completed within an extremely challenging time frame of 17 months and comprises the following three units:

- Naphtha Hydrotreater /Reformate Splitter
- Isomeriser cum LPG Recovery
- FCC Gasoline Splitter – Prime G + Selective Hydrodesulphurisation

At each stage of the project, Punj Lloyd set an ambitious time target and successfully achieved it. The completion of 80% of engineering work was achieved within a relatively short period of 8 months.

The plant model of this project was conceived through 3D models on

PDMS software. We have completed the Hazard and Operatability safeguard study (HAZOP).

We also carried out a techno-commercial evaluation of vendors' offers for various bought-out items, such as Pumps, Compressors, Refrigeration Unit, MCC/PMCCs/DCS, Columns, Vessels, Exchangers, and placed orders for the same, thereby completing the vendor engineering part of this project.

Electrical and instrumentation design is also progressing on schedule with the release of single line diagrams, which form the basis for manufacturing MCC/PMCCs. Advances have also been made in developing Plant Control Systems by the supplier who is developing process control logic.

Over one thousand concrete piles were completed within six months. A challenging task in an existing refinery. We are well ahead of schedule in every segment and plan for timely execution of this project.

Scope of Work

Residual process designing, detailed engineering, procurement, supply, manufacturing, fabrication, construction, installation, pre-commissioning, commissioning, the handing over of the Motor Spirit Quality Upgradation project on single point responsibility basis to IOCL.

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Safety Training

It is mandatory for all our workers to undergo a safety training as a part of their induction, without which premission is not granted to go on site. This training focuses on general safety awareness, first-aid, emergency procedures, use of personnel protective equipment and specific site hazards. Daily tool box talks at various locations of work site are conducted by our site supervisors and engineers. Refresher training is conducted every six months to ensure that all workers on site are kept up to date with safety requirements.

Safety Promotion

In our endeavor to encourage our personnel to put safety first, we started a system of recognising two individuals each month for best safety performance. This practice not only rewards those who make that extra effort, but also encourages all others to do the same.

Safety Inspection And Follow Up Action

Daily site inspections are conducted and reports prepared. The observations, if any, are then discussed with the resident construction manager and site engineer for remedial action to rectify any deficiency identified or unsafe practices discovered .

Hazard Identification And Risk Assessment

Prior to the commencement of any potential high risk operation, a detailed hazard analysis and risk assessment of the task is prepared to highlight the measures necessary to reduce or eliminate the level of risk.

Permit to Work

A formal written 'permit to work' system has been developed to control 'hot jobs,' in addition to excavation, working at a height, radiography etc.

Emergency Preparedeness Plan

We have a detailed emergency preparedness and evacuation plan in place at site, which addresses emergencies that may arise during construction activities and how to overcome them.

Personal Protective Equipment

Not only do all our workers at site wear the safety gear, we ensure that even our visitors during their visits do the same, as this site is marked as a 'Hard Hat Site.'

First-aid

A first-aid base has been established at the central location of the principal work area with a treatment room, stocked for emergencies at site on a 24x7 basis. Pre- medical check-ups for all employees are an absolute must.

Work Environment Monitoring

We have appointed Pollution & Project Consultant, Calcutta, a reputed Environmental agency to monitor pollution levels of dust, noise and the illumination at site on a quarterly basis.

Fire Prevention

At various locations around the site, clearly visible fire points have been established for use in an emergency. Each fire point is equipped with dry powder extinguishers, water type extinguishers, and buckets of sand. Everyone at site has been trained in the use of fire fighting equipment and techniques.

Hygiene

It is a major thrust area for Punj Lloyd and so adequate water supply at the site at all times has been ensured by us.

As safety is an essential aspect of our business, we all strive hard to make ZERO ACCIDENT a reality.

◆ N C Gupta and D Dhal

Caring for the community

As a testimony to our commitment Punj Lloyd-Limak JV has conducted training programs related to safety measures and precautions to be adopted near the site. Prior to construction, we organised Traffic Awareness and Community Safety training sessions for all the 119 villages along our pipeline route. The training covered details of heavy equipment which would be used, the dangers of allowing children along the route, measures taken by us to protect the environment, dust and sound pollution and most importantly, safety of the local community.

Before setting up camp, we initiated Land Entry Protocol meetings with the village Muhtar (village head) and the villagers, to ensure that the community's agricultural land on which we were about to commence work had been acquired to their satisfaction. This went a long way in smoothening our construction hiccups and endeared ourselves with the Turkish community with whom we were to start a long-term working relationship.

We held monthly construction information meetings for the villagers, both jointly and separately for the women. We updated the community about the status of the construction, progress of work, advise the women whose husbands were employed with us about the duration of their employment, reiterate the aspect of safety of their children.

Toll free telephones were provided for registering complaints of the local community regarding any aspect of construction along the ROW. This was followed up by monthly interaction with the villagers to resolve any complaints or implement suggestions.

Good Health

Medical check-ups in 50 villages were held. Sometimes 100 villagers turned up and were checked up for common ailments as well as for serious physical conditions like sexually transmitted diseases. These villages are located in remote parts of Turkey and often the villagers do not have access to medical services.

Ambulances are always ready at site to cater to any medical emergency not only for project personnel but also for the neighbouring villagers.

An informative presentation on Sexually Transmitted Diseases is made separately to male and female members of the audience as a mandatory part of our health check-up activities. We believe that this world can be a disease free place and therefore do our little part to make that a reality in all the sites where we work all over the world.

◆ S Senih Karaman MD

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