First South East European
Regional CIGRÉ Conference
SEERC
Portoroz, Slovenia, 7—8 June 2016

Removing 3-core Oil-Filled Submarine Power Cable Dugi Rat –Postira from the Seabed

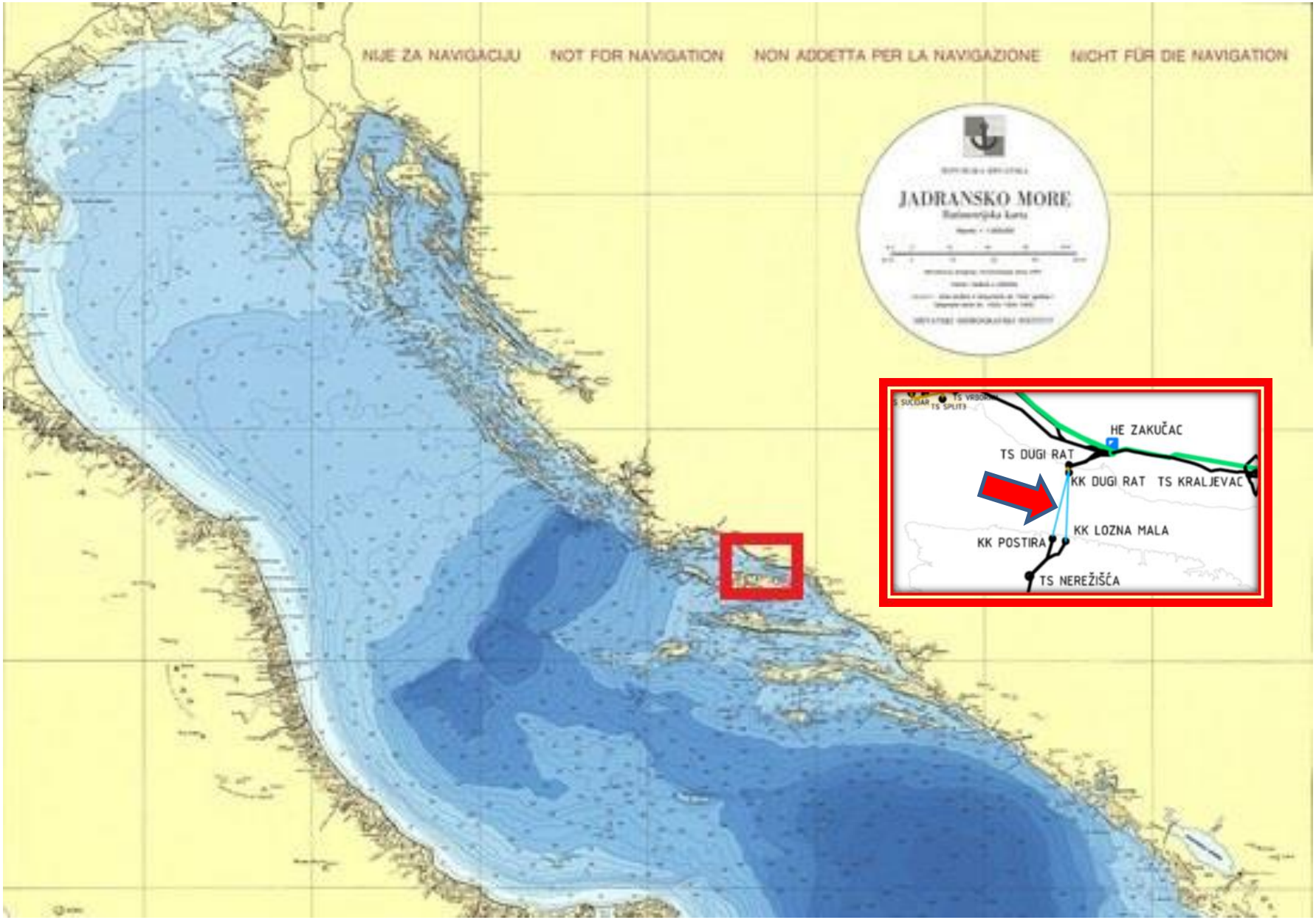
2-10

SREĆKO ALJINOVIĆ
Hrvatski operator prijenosnog sustava d.o.o.

MARIO GUDELJ
Hrvatski operator prijenosnog sustava d.o.o.

LEO ŠTRBAC
Projektni biro Split d.o.o.

IVAN TOPIĆ
Brodometalurgija d.o.o.


NIJE ZA NAVIGACIJU
NOT FOR NAVIGATION
NON ADDETTA PER LA NAVIGAZIONE
NICHT FÜR DIE NAVIGATION
JADRANSKO MORE
HE ZAKUČAC
TS DUGI RAT
KK DUGI RAT
TS KRALJEVAC
KK LOZNA MALA
KK POSTIRA
TS NEREŽIŠĆA

110 kV Dugi Rat – Postira oil-filled cable

- 3 September 1968 the cable was installed.
- At the beginning 800 m/hour ➔ increased to 2000 m/hour.

- High altitude difference and long mainland section:

  ➔ STOP JOINT ON THE CABLE LANDING POINT

- Postira: -cable was stressed probably more than allowed

  -sheath contracted into a trefoil formation

- During the initial stage of operation, by 1978 ➔ 30 kV thereupon ➔ 110 kV

Fatal fault on 110 kV Dugi Rat – Postira oil-filled cable

- **UNKNOWN PERSON TRIED TO SAW UP THE CABLE**

Attempt to repair the fault on 110 kV Dugi Rat – Postira oil-filled cable

REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Design documentation

- Implementation of an administrative procedure in compliance with applicable legislative regulations.
- Recovery of existing oil-filled cable, laying a new cable and its commissioning.
- Building permit and ordering design documentation.
- Ministry of Construction and Physical Planning

  ➔ **location permit was not required**

- Main design certificate ➔ 15 October 2014
- Detail design ➔ June 2015

REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Concept of recovering

- Regulations involving removal of buildings (cable):
  - stability of the surrounding and other land
  - meeting other basic requirements
  - public interest should not be jeopardized
- Handling building waste generated by removing
- Mechanical resistance and stability, sanitary conditions, health and protection of the environment
- **Three key processes of the cable removal:**
- Cable oil removal and its ecological management
- Cable hauling up from the seabed
- Getting the cable ready for transport on the wharf and its ecological management

REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Concept of recovering

PART	LENGHT [m]
LENGTH OF LONGITUDINAL PROFILE	7338
REQUIRED LENGTH FOR THE SEA DEPTH (2X65 M)	130
CABLE PART STOLEN ON THE MAINLAND SIDE	-401
CABLE PART STOLEN ON THE BRAČ SIDE (ESTIMATE)	-700
TOTAL LENGTH	**6367**

- Cable position was determined ➔ divers managed to locate the cable ends on both sides

- No bigger mechanical damage, sealing in good condition
- Lifting the cable ends:
  - so-called parachutes
  - adequately fixed on the watercrafts on both sides
- In order to start removing the cable ➔ oil was removed from the cable
- Company certified for this kind of jobs

REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Process of cable oil removal

REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Process of cable oil removal

- **PRESSURE SIDE (DUGI RAT)** ➔ pumping the seawater containing the chemicals (agent for decreasing the entire length of the cable)
- **SUCTION SIDE (BRAČ)** ➔ cable content was collected in a vacuum tank by means of a compliant adapter
- On the pressure side, there were tanks with a mixture of seawater and degreaser, which was pumped into the cable
- On both sides ➔ measurement and recording of the liquid media

- The liquid from the cable collected in the vacuum and additional tanks ➔ transported to the waste management facility

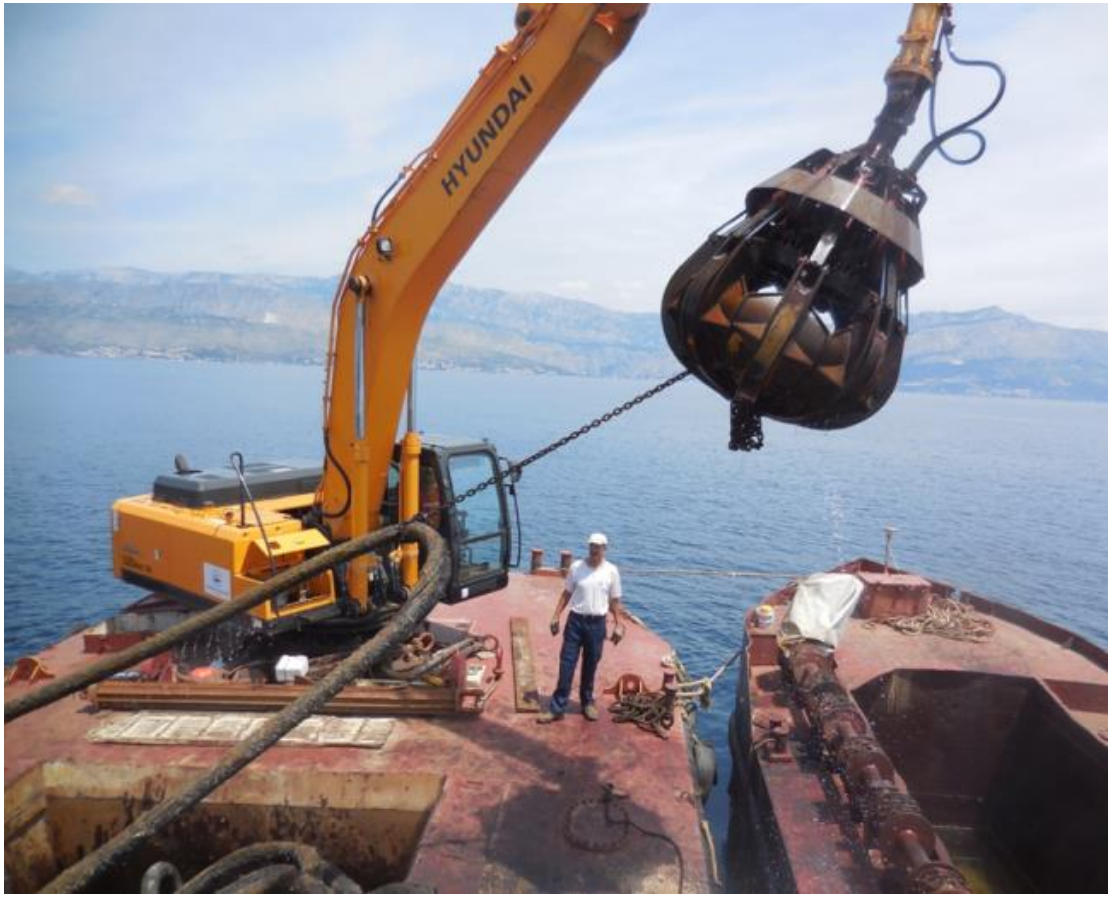
REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Cable removal from the seabed

CABLE REMOVING PROCESS SHOULD MEET THE FOLLOWING CONDITIONS:	
Impeccable coordination	Professional diving team
Favourable weather conditions	A fleet of exceptional maritime properties
Faultless operation of all pieces of equipment	Precise homing of the vessel

- Cables have been laying on the seabed for decades ➔ might have suffered damages that are not visible

THE WEATHER CONDITIONS MUST SATISFY THE FOLLOWING CONDITIONS:
Monitoring of weekly and daily weather forecasts before starting the cable removal
Fixing the removal date in agreement with the meteorologist
Choosing the side featuring better oceanographic and meteorological conditions as a starting point for the cable removal

REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Cable removal from the seabed



REPLACING 110 kV Dugi Rat – Postira OIL-FILLED CABLE - Getting the cable ready for transport

First South East European
Regional CIGRÉ Conference
SEERC
Portoroz, Slovenia, 7—8 June 2016

Removing 3-core Oil-Filled Submarine Power Cable Dugi Rat –Postira from the Seabed

THE END

THANK YOU FOR ATTENTION

SREĆKO ALJINOVIĆ
Hrvatski operator prijenosnog sustava d.o.o.

MARIO GUDELJ
Hrvatski operator prijenosnog sustava d.o.o.

LEO ŠTRBAC
Projektni biro Split d.o.o.

IVAN TOPIĆ
Brodometalurgija d.o.o.

Removing 3-core Oil-Filled Submarine Power Cable Dugi Rat –Postira from the Seabed

SREĆKO ALJINOVIĆ
Hrvatski operator prijenosnog sustava d.o.o.

MARIO GUDELJ
Hrvatski operator prijenosnog sustava d.o.o.

LEO ŠTRBAC
Projektni biro Split d.o.o.

IVAN TOPIĆ
Brodometalurgija d.o.o.