

POLYBORE

A Wellbore Liner And Patch System



- 20+ year history of using similar process to line horizontal pipelines
- 16 year history in pipelines for oil and gas in Canada
- The **POLYBORE** process turns it **vertical** – same fluids, gas contact issues, and deposits as in horizontal pipeline applications



- 6 years from idea stage to present
- The process has been used on 300 plus wells – all 114.3mm and 139.7mm applications
- Initial testing in 177.8mm and 193.7mm CO₂ wells proved successful



- **Provide** a new and innovative casing patch technology
- **Cost** saving alternatives for water injection and disposal well applications
- **Optimize** production in gas and CO₂ wells
- **Corrosion** prevention
- **Wear** barrier in Artificial Lift applications
(Tubing is rotated or stroked)



- **139.7mm** Casing lined to 895 meters
- **Polybore** technology enables producer to dispose produced fluids down lined wellbore without tubing and packer
- **Results**, producer disposing of 4000m³/day of water with zero pressure at surface
- **Producer** plans second Polybore completion in late September



- **Well Problem** - Casing corrosion with several pin hole leaks to 600m
- **Solution** – Cement Squeeze worst section of casing, line wellbore with Polybore nylon liner to 640m
- **Results** - producer re-established casing integrity. Rod pump landed at 1189m, well back on production.



- **139.7mm** casing lined to 851 meters
- **Polybore** technology enabled customer to dispose produced fluids down lined wellbore without tubing and packer
- **Results** – producer is disposing maximum rate of 1900m³/day at zero surface pressure



- **114.3mm** casing lined to 668 meters
- **Polybore** technology restored integrity to the wellbore, allowing the producer to continue use of the wellbore for injection down tubing string with packer.
- **Results** – Producer has the well back on injection with full approval of SEM



- High density polyethylene wellbore liner

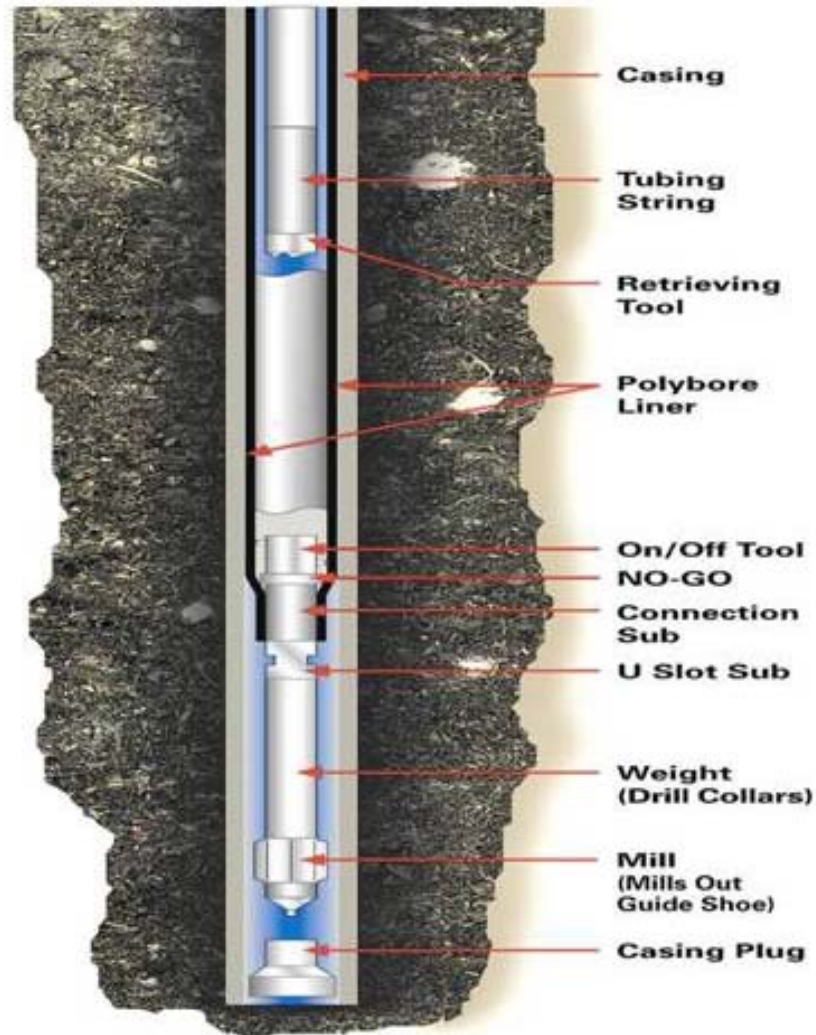


**Depths
to 1300m**

- Corrosion Protection
- Corrosion Control
- Chemical Resistance
- Wear and abrasion resistance

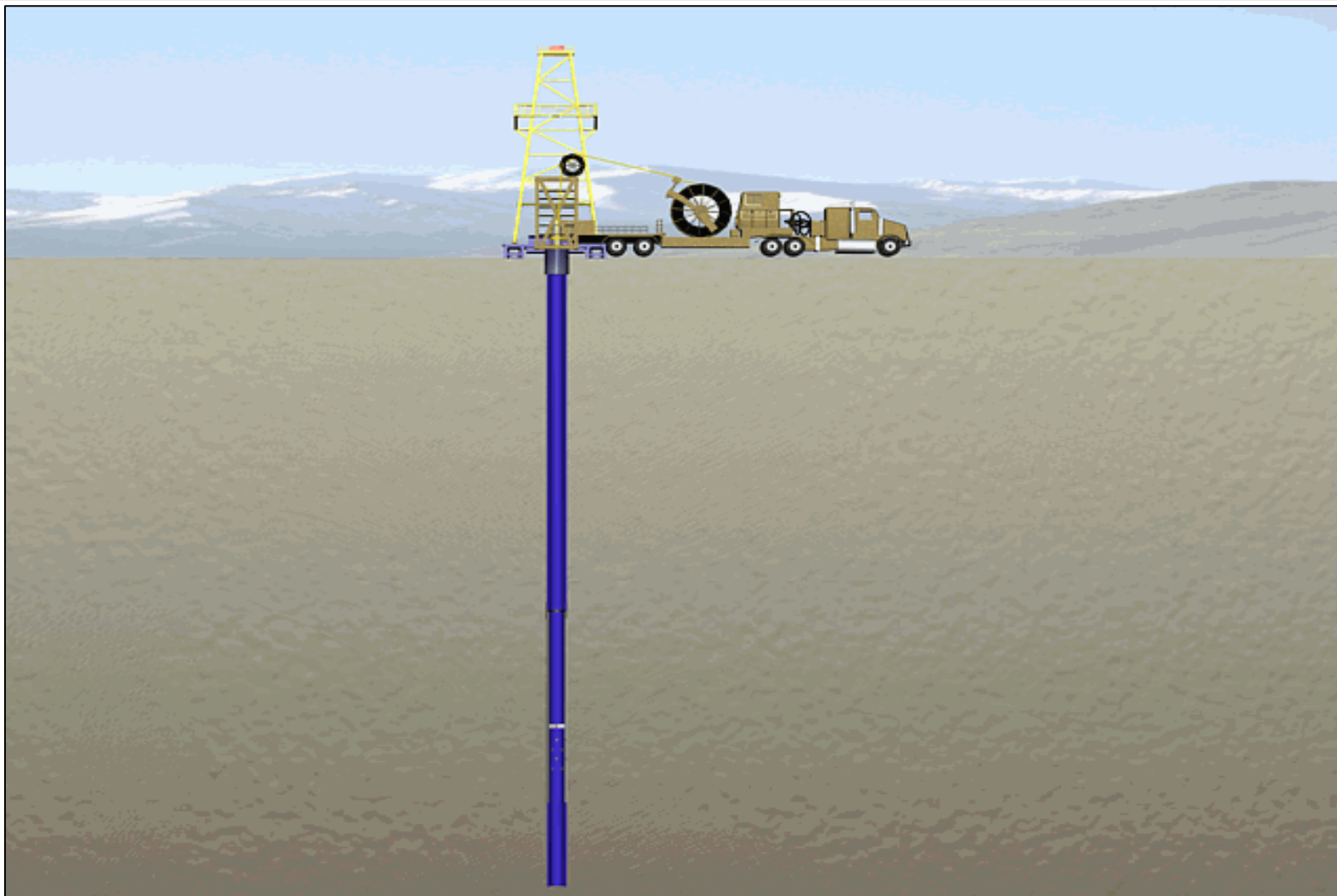
- Water Injection and Disposal Well Optimization
- CO₂ Injection Well Optimization
- HDPE is Applicable Where BHT does not exceed 65°C





Meeting wellbore challenges with effective solutions...





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- Wellbore patch system

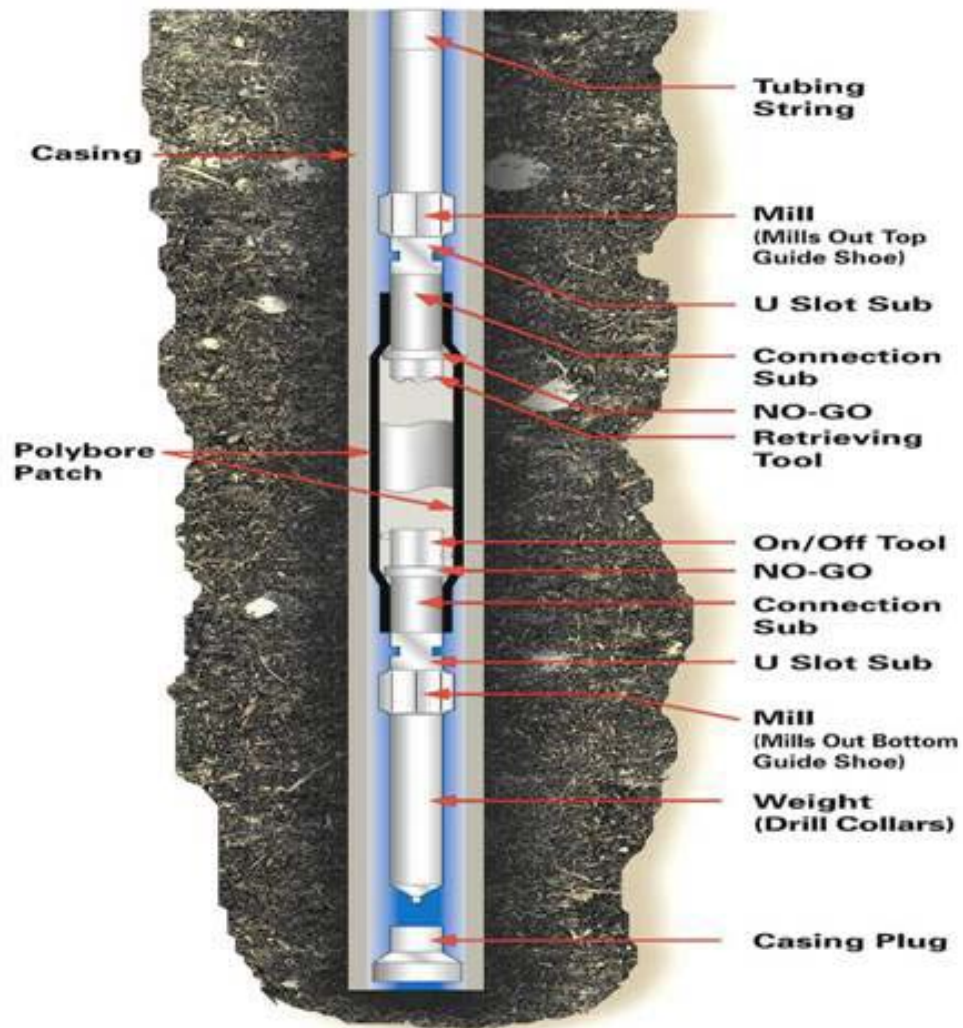


**Depths to
1300m**

- Repair pin hole leaks
- Plug off existing perforations

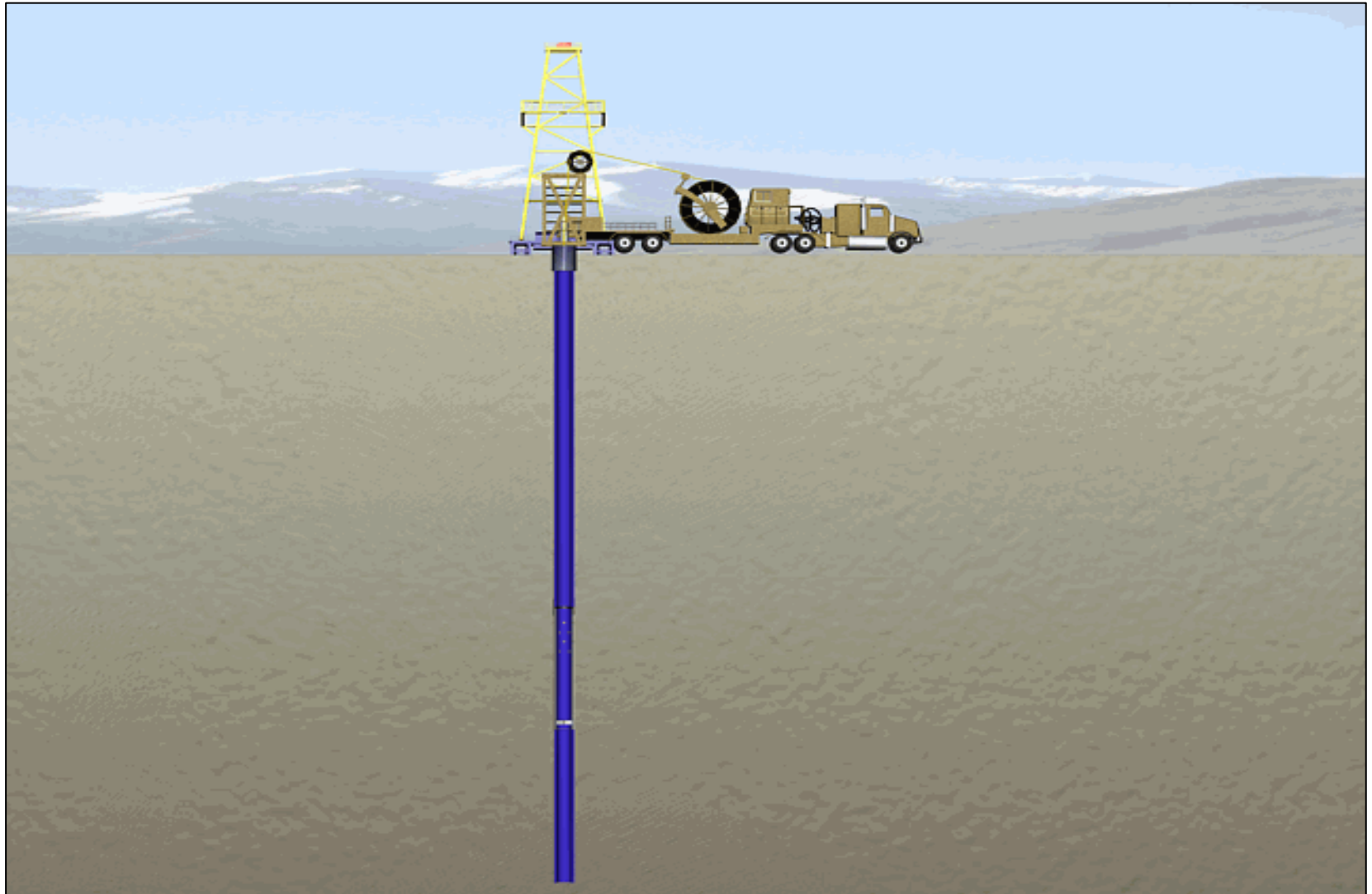
- Repair and control wellbore corrosion at specific intervals





Meeting wellbore challenges with effective solutions...

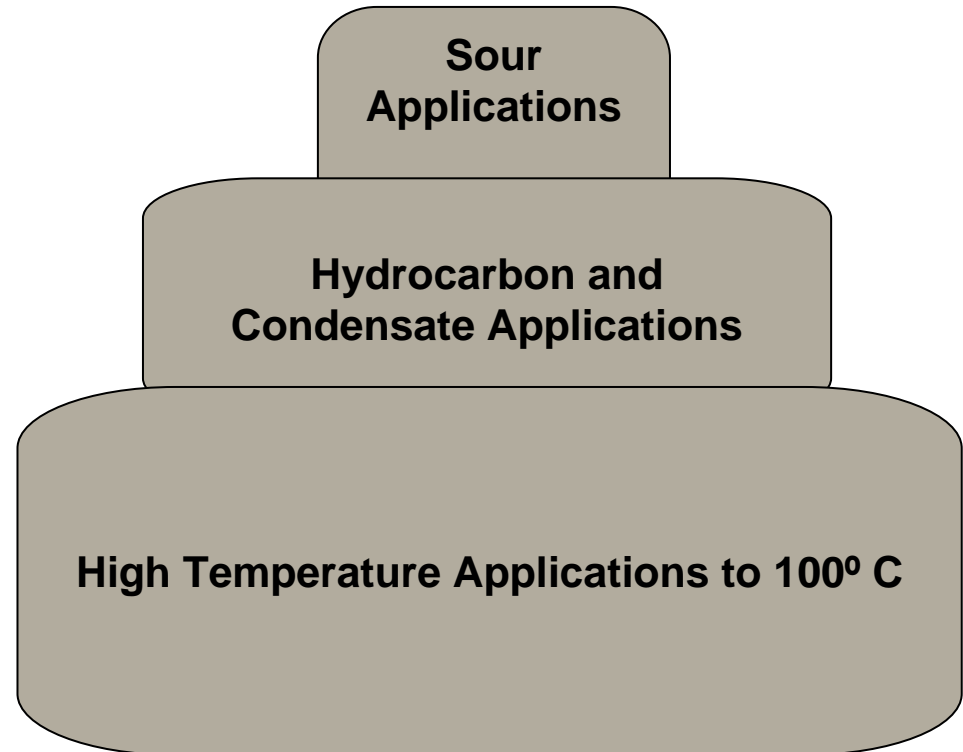




Meeting wellbore challenges with effective solutions...



- Polyamide 11 Liner



Casing Diameter (mm)	Weight w/coupling (kg/m)	Casing ID (mm)	Casing Drift Casing Drift Diameter (mm)	Polybore Polybore Liner ID (mm)	Reduction of Reduction of Liner ID (mm)
114.3	14.14	103.886	100.711	90.932	12.954
	15.63	102.921	99.746	89.865	13.056
	17.26	101.600	98.425	88.392	13.208
139.7	20.83	127.305	123.876	111.100	16.205
	23.07	125.730	122.555	109.372	16.434
	25.30	124.257	121.082	107.594	16.662
177.8	29.79	163.982	160.807	143.596	20.396
	34.23	161.696	158.521	140.970	20.726
	38.69	159.410	156.235	138.354	21.057

Casing Diameter (Inches)	Weight w/coupling (lbs/ft)	Casing ID (Inches)	Casing Drift Diameter (Inches)	Polybore Liner ID (Inches)	Reduction of Liner ID (Inches)
4 1/2	9.50	4.090	3.965	3.580	0.510
	10.50	4.052	3.927	3.538	0.514
	11.60	4.000	3.875	3.480	0.520
5 1/2	14.00	5.012	4.877	4.374	0.638
	15.50	4.950	4.825	4.303	0.647
	17.00	4.892	4.767	4.236	0.656
7	20.00	6.456	6.331	5.653	0.803
	23.00	6.366	6.241	5.550	0.816
	26.00	6.276	6.151	5.447	0.829



Meeting wellbore challenges with effective solutions...

Material	Temp Limits	Tensile Str	Chemicals
HDPE	65° C / 150° F	22000 kPa	some
Rilsan	100° C / 210° F	42700 kPa	most



Requirements:

- spoolable
- fusible
- reducible

- Depends on wall thickness and material
 - Ranges with conventional weights, in air
 - HDPE - 1300 m
 - RILSAN - 2100 m
- With diesel and reduced weight?
 - HDPE - 2100 m (limited by 65° C temp max)
 - “Nylon” RILSAN - 3050 m (100° C max)
- Depths include the weight - 20% safety factor



- Applications with holes larger than pin holes reviewed on a case-by-case basis
- The wellbore casing must be scraped
- The wellbore casing must be round and not parted nor have severe doglegs (limit of 5 degrees per 30m)
- Temperature within the range of the plastic at flowing temperatures
- No highly deviated wells (>15 degrees)



- Tested and proven system
- Liner system for production casing that is chemical, corrosion, and wear-resistant
- Wellbore patch alternative for pin hole leaks, corroded segments, or for shutting off unwanted perforations
- Production and injection enhancements



- Economic benefits from power savings alone on injection and disposal well applications
- Enhanced payback from production increases in gas and CO₂ wells
- Considerable reductions in corrosion repair costs
- Increased installation efficiencies with the patch system resulting in substantial savings



1. **People** – Experienced personnel at all levels
2. **Equipment** – Designed specifically for market conditions
3. **Technologies** – Developed with customers and suppliers
4. **Customers** – Working together to provide innovative solutions
5. **Suppliers** – Joint development of technology





- At **Trican**,
100%
customer
satisfaction is
our **goal...**
EVERY TIME

