Coiled Tubing Handbook

7 Chapter 1: Evolution of Coiled Tubing Equipment
Concepts are explained, along with descriptions of major coiled tubing equipment and components
A. Sas-Jaworsky II

19 Chapter 2: Workover Safety
Recommendations are provided for designing and implementing safe and efficient coiled tubing workovers
A. Sas-Jaworsky II

23 Chapter 3: New Guidelines Should Enhance Coiled Tubing Well Control Security
Recommendations are provided for installing, testing, and using well control components to facilitate safer CT operations
A. Sas-Jaworsky II

33 Chapter 4: Tube Technology and Capabilities
Better performance and reliability have resulted from improvements in coiled tubing manufacturing technology
A. Sas-Jaworsky II

39 Chapter 5: Predicting Friction Pressure Losses in Coiled Tubing Operations
Valid for both spooled and straight pipe this friction pressure prediction technique accounts for wall roughness
A. Sas-Jaworsky II and T. D. Reed

45 Chapter 6: Predicting Friction Pressure Losses in CT Annuli: An Improved Method
Techniques apply to Newtonian fluid flow within tubing annuli encountered in coiled tubing well intervention services
A. Sas-Jaworsky II and T. D. Reed

51 Chapter 7: Sands and Solids Cleanouts
Proper planning and implementation of recommended workover practices can improve concentric wellbore cleanouts
A. Sas-Jaworsky II

61 Chapter 8: Unloading Wells with Lighter Fluids
Circulating lower density fluids and nitrogen-assisted lifting are the most common methods for unloading wellbore liquids
A. Sas-Jaworsky II

69 Chapter 9: Logging with Coiled Tubing
Coiled tubing has been effective for conveying logging and perforating tools in high-angle wells. This chapter discusses new equipment components, planning considerations, and job implementation guidelines
C. G. Blount

77 Chapter 10: Cement Squeezes
Details are provided for designing and performing coiled tubing remedial squeeze workovers, including equipment, pre-job considerations, slurry guidelines, quality checks, placement and clean-out procedures, and post-squeeze testing
C. G. Blount, W. Crow, L. Gantt, J. Julian, E. J. Walker, and A. Worthington

89 Chapter 11: Underreaming
Underreamers, used to remove scale and excess cement after squeeze work, reduce costs by eliminating the need for conventional rigs
J. L. Welch and R. R. Whitlow

95 Chapter 12: Fishing
Guidelines, tools, and methods will assist in the planning and implementation of through-tubing fishing operations
J. L. Welch and R. K. Stephens

101 Chapter 13: Velocity Strings
Hanging off coiled pipe inside tubing is a safe, economic means of returning wells that have loaded up with liquid to flowing status
P. T. Brown and R. D. Wimberly

105 Chapter 14: Stimulation
Planning, designing, and implementing formation damage removal treatments using reeled pipe techniques
A. Sas-Jaworsky II

111 Chapter 15: Sand Control
Concentric gravel pack or chemical sand consolidation can reduce costs, while increasing production and recovery rates
D. A. Rich and T. H. Blue

117 Chapter 16: Coiled Tubing Cuts Horizontal Screen Repair Cost
Huge savings were realized after using a CT unit instead of a rig workover for concentric sand screen repair
W. Crow, P. Hill, and R. Johnston

123 Chapter 17: Operator's CT Drilling Program Gets Good Results
Mechanical and economic success rates have been high for numerous wells drilled using CT in a variety of locations
C. M. Hightower

About the cover: Apache Canada's Hatton Field has about 3,000 wells producing around 80 MMcfgd. Since acquiring the field in 2001, Apache has drilled about 1,400 coiled tubing wells at Hatton, including this well drilled in 2003. The wells are drilled to the Milk River and Medicine Hat formations at about 800 m below the surface of the Saskatchewan plains. More recently, Apache has adopted an improved fracture coiled tubing stimulation design that slows the wells' decline without reducing initial output rates.