Technical Oil Mission (TOM) Microfilm Reels – Background and New Developments

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The US Technical Oil Mission

• Outcome of discussions in the US Petroleum Administration for War (PAW) in 1943-1944

  – Originated in the Technical Advisory Committee (TAC) of the Petroleum Industry War Council (PIWC)
  – Proposed sending scientific and engineering experts into enemy countries (mainly Germany and Japan) as soon as war conditions permitted
  – Members recruited from US oil and chemical companies, and the US government Bureau of Mines (BOM)

• Worked in close cooperation with counterparts from the United Kingdom, the British Intelligence Objectives Subcommittee (BIOS)

• Teams sent to Germany as early as February 1945

• Most returned to previous employers by October 1945.
TOM Subject Areas

• **Products & Test Methods (7)** - P.K. Kuhne, (Gulf Oil), Chairman.
• **Gasification & Carbonization of Solid Fuels (7)** - A.R. Powell (Koppers Co), Chairman.
• **Hydrogenation of Coal, Tar and Oil (9)** - L.L. Hirst (BOM), Chairman.
• **Hydrogenation Synthesis of Oil from Water Gas (FT) (11)** - I.H. Jones (Koppers Co.), Chairman.
• **Oil Shale Processes (3)** - W.W. Odell (BOM), Chairman.
• **Materials of Construction, Including Metallurgy (5)** - E. Voss (Humble Oil/Refining Co), Chairman.
• **By-Products from Hydrocarbons Produced in Synthetic Oil Processes (9)** - V. Haensel (Universal Oil Products Co.), Chairman.
Members of the TOM Teams

- J.G. Allen (Phillips)
- H.V. Atwell (Texas Co)
- E.L. Baldeschiweler (Standard Oil Dev)
- G.S. Bays, Jr. (Humble)
- Ernest Cotton (Gulf Oil)
- L.P. Evans (Socony-Vacuum)
- W.F. Faragher (Houdry)
- Donald S. Fraser (PAW)
- Vladimir Haensel (UOP)
- L.L. Hirst (BOM)
- W.A. Horne (Gulf)
- I.H. Jones (Koppers)
- J.P. Jones (Phillips)
- Paul K. Kuhne (Gulf)
- M.R. Mandolbaum (Kenyon & Kenyon, Lawyers)
- L.L. Newman (BOM)
- B.L. Mackusick (Pure Oil)
- Earl J. Opal (PAW)
- W.V. Odell (BOM)
- E.B. Peck (Standard Oil Dev)
- A.R. Powell (Koppers)
- Edward Rogers (BOM)
- Hans Schindler (Pure Oil)
- W.C. Schroeder (BOM)
- Guenther von Elbe (BOM)
- H.M. Weir (Consultant).
The British (BIOS) Teams were set up to Investigate Similar Topics

- Fischer-Tropsch group, 10 men.
- Lubricating Oil group, 4 men.
- Utilization and Performance, 5 men
- Carbonification and Gasification, 9 men
- Hydrogenation, 11 men.
TOM Activities

• Entered “Targets of Opportunity” behind US/British Armies
  – Production plants (refineries, synthetic fuels, chemicals)
  – Research Laboratories (especially Kaiser Wilhelm Institute)
  – Company headquarters (especially I. G. Farben and Ruhrchemie)
  – Included only territory held by US/British forces

• Confiscated all relevant documentation
  – Production Records
  – Plant diagrams and vessel drawings
  – Research notebooks/records
  – Technical and meeting/conference reports

• Conducted interrogations of key scientific personnel
TOM Activities (cont)

- Shipped documents to London for processing under auspices of the Combined Intelligence Objectives Subcommittee (CIOS)
  - Initial plans for extensive translating, indexing, and reporting overwhelmed by sheer volume of documents
  - Finally simply microfilmed documents “at random”
  - 141 reels produced in London
  - Operations shifted to US, where a further 164 reels produced.

- Also included material collected by other agencies
  - US Army Field Information Agency, Technical (FIAT)
  - US Naval Technical Mission to Europe
  - US Naval Technical Mission to Japan
  - US Strategic Bombing Survey
  - Reportedly little cooperation between each of these groups, or between them and TOM/BIOS/CIOS

- All documents classified as secret until the war’s end
  - Declassified in second half of 1945
Post-war Synthetic Fuels Activities in US

- Technical information gained from TOM activities, combined with earlier and ongoing US government and corporation research, led to significant development/commercialization efforts
- Two Bureau of Mines Demonstration Plants in Louisiana, Mo
  - Utilized direct contributions of German technical experts (operation “Paper Clip”)
  - 200 bbl/d direct coal liquefaction plant (Donath, Schapperts, Frese)
  - 50 bbl/d coal syngas Fischer-Tropsch synthesis plant (Pichler, Alberts)
- One Commercial (8,000 bbl/d) Natural Gas to Liquids Plant
  - Carthage-Hydrocol, Brownsville, Tx – later taken over by Stanolind
- Mid-1950’s Collapse of oil prices after middle east discoveries ended commercialization effort – except in South Africa (Sasol)
- Interest in TOM materials largely vanished
The German Document Retrieval Program

- 1970’s oil embargo and subsequent price escalation revived interest in synthetic fuels – especially from coal
- German Document Retrieval Program initiated at Texas A&M University in 1975.
- Collected a very large quantity of information
  - Complete TOM microfilm set
  - Hard copies of BIOS/CIOS/FIAT/etc reports and documents
  - Interviewed surviving German scientists and TOM team members
- Began (again) indexing, abstracting and publishing results
  - Completed 8,000 of 600,000 collected papers by late 1978
- Project funding cut off in 1982
  - Collecting more-or-less completed, processing only begun
Fischer-Tropsch.org Website

- Created by Syntroleum and Tony Stranges in 2000 to collect and publish early FT documents in digital format
- Extensive current holdings
  - Over 6000 worldwide patents
  - Over 600 government reports (BOM/DOE/BIOS/CIOS/TOM/etc.)
  - Approximately 8 gigabytes total material
- Presently have relatively small number (ca. 40) of documents directly from the TOM microfilm reels
  - Standard microfilm reader to print paper (hard) copy
  - Digital paper scanner to create electronic version
  - Image quality generally poor (too many steps removed from film)
  - Cost and manpower effort excessive
  - Largest hurdle locating documents of interest
Recent Developments

• **TOM microfilm reel efforts at an impasse in early 2002**
  - A great deal of relevant FT documentation present somewhere, but indexing/contents not very complete
  - Searching on Microfilm reader very labor intensive
  - Resulting digital images several generations removed from film

• **In mid 2002 Sasol inquired about the possibility of obtaining a set of the TOM microfilm reels**
  - Discussions regarding Fischer-Tropsch.org effort since 2000
  - Film copying relatively “easy”, but same problems remain

• **While investigating potential vendors for film copying, another alternative became apparent**
TOM Microfilm Enters the Digital Age

- The last decade saw a huge improvement in digital imaging technologies
  - A number of commercial vendors offer complete microfilm digitization services – generally for converting company and/or government archival records
- A joint Sasol-Syntroleum-Texas A&M University program was initiated in late summer/early fall 2002
  - Microfilm reels obtained from Texas A&M University Archives
  - Significant Sasol funding contribution
  - Syntroleum program management/coordination
  - Performed by experienced film-scanning vendor (GetImaging, OKC)
- Complete set of digital images of the entire TOM microfilm collection received December, 2002
The TOM Reel Digital Archive

- **Results consist of a staggering amount of information**
  - Final count approximately 296,000 individual images
  - Delivered on ca. 340 CD-ROMs (87.4 gigabytes total)
  - Simply inspecting results for job completeness/payment required almost 1 man-month
  - Raw images larger than original page size, typically somewhat “noisy”

- **Image quality generally very good, although some are poor**
  - Original war environment contributed to some poor originals
  - Some filming performed badly
  - Film is currently 55+ years old – some has degraded
  - Automated scanning offers multiple possibilities for errors
  - First pass approximately 70 out of 310 reels required additional inspection/rescanning efforts (240 good or very good)
  - Currently working to improve ca. 45-50 remaining reels.
TOM Reel Digital Archive (cont)

- **Substantial processing activities already completed**
  - Collected internal indexes/tables of contents for 270 reels
    - Currently collecting title pages for remaining reels
  - **Fully processed approximately 20 reels to date**
    - Cropped all images to original paper size
    - Cleaned up margins/noise (significantly reduces file size)
    - Recombined images into original documents
    - Web linked to text based (HTML) tables of contents

- **Efforts focused on Fischer-Tropsch related items and reels**
  - Initial estimates in range of 80,000 pages (very rough)
  - Unlikely that Syntroleum or Sasol will pursue processing non-FT related documents anytime soon
Digitized TOM Reels Now Available

- **Master Table of TOM reels posted on FT.org website**
  - Original reel designation and source
  - Number and approximate quality of images
  - Image (ca. 270) and text (20-30 so far) tables of contents
  - Reel number 1 posted in its entirety in 2 formats
    - Collection of individual images as received
    - Fully processed (cleaned and grouped) documents

- **Offering TOM documents for sale “by the reel”**
  - $125.00 per reel “as is”
  - $250.00 per reel fully processed (where available)
  - Substantial discount for multiple reels or entire set
  - Proceeds (if any) to support further processing
Future Plans

- Program for translation, summary, and reporting of key German TOM documents
  - Prof. Cal Bartholomew (BYU)
  - Sasol/Syntroleum funded

- Investigating contents and/or availability of additional document/data sources
  - FIAT reels included in TOM only small portion of total
  - > 1000 BIOS/CIOS/FIAT report hard copies at Texas A&M
  - Government records declassified in 1995 as part of Nazi War Crimes Disclosure Act
    - Microfilm and hard copies available through NARA
  - BOM Louisiana, Mo demonstration plant operations records
TOM Background References
(most available on Fischer-Tropsch.org)

• The Story of the Technical Oil Mission
  • By Albert E. Miller, 1945

• The World War II German Synfuels Program
  • By Kurt J. Irgolic, 1979

• Fifty Years in Synthetic Fuels Information: Have We Lost a Strategic National Resource?
  • L. M. Roseberry, 1987

• Germany’s Synthetic Fuel Industry.
  • Anthony Stranges, 2000
  • In The Chemical Industry in the Twentieth Century.
  • Ed. by John E. Lesch, Kluwer Academic Publishers