

## **A Brief Etymology of 'Tar Sands' v. 'Oil Sands' Terminology by Eben Rose**

A Boolean search on the geological literature database GeoRef with the constrained terms "tar sands" and "oil sands" has revealed some interesting aspects of the history of both terms. GeoRef is a particularly useful database since it contains peer-reviewed scientific journal articles as well as books, book chapters, government reports and professional papers, and conference abstracts dating to the origin of geology as a discipline.

"Tar sands" first appears in any form in this literature in reference to western Canadian petroleum in an 1891 Annual Report by the Geological Survey of Canada entitled, "Tar Sands on the Athabasca River" by R.G. McConnell.

This term carries through in various reports through the early 20th Century and to the modern day with increasing frequency, mostly in reference to occurrences in western Canada.

A similar term appears as "bituminous sands" in reference to western Canadian petroleum in the Athabasca region in a 1914 publication (Ells, S.C., Summary report on bituminous sands of northern Alberta, Canadian Mines Bureau Summary Report of 1913). "Bituminous sands" appears to be used interchangeably or as a substitute for "tar sands" in various reports in the early 20th Century and occasionally more recently than this up to the modern day.

"Oil sands" is an older term that was first applied to Pennsylvania crude (Ashburner, C.A., 1878, The oil sands of Pennsylvania) which is a very low-sulfur, low-viscosity crude oil. This term appears to reference liquid petroleum that is hosted in a porous sandstone rather than as a solid or semisolid. The term "oil sands" spread to other Appalachian occurrences as well as to Oklahoma (e.g. Aurin, F., 1917, Correlation of the oil sands in Oklahoma, Bulletin of the Oklahoma Geological Survey) and California (Gester, G.C., 1917, Geology of a portion of the McKittrick District, Proceedings of the California Academy of Sciences). All of these occurrences are, by modern standards, high-grade crude oil (i.e., sweet, light crude) that is hosted in porous sandstone and that can be drilled by conventional means.

Two separate reports in 1922 provide a glimpse of the difference in use of these two terms as they relate to actual material properties. A report by K.A. Clark (Scientific and Industrial Research Council, Alberta, 2nd Annual Report) discusses the potential for commercial development of "bituminous sand" not as a source of refined petroleum, but as an industrial source of asphalt with the possibility for kerosene extraction. That same year, a doctoral thesis by C.F. Melcher (George Washington University) discussed techniques and challenges related to "oil sand" extraction using conventional drilling techniques and the limitations of such extraction when confronted with "the bituminous variety".

In the decade that followed, Dr. K.A. Clark developed steam and chemical extraction techniques that produced a marketably upgraded oil product from Alberta bituminous sands, and the first commercial plant (Great Canadian Oil Sands, now Suncor) for this extraction opened in 1966, months after Clark's death. Note the choice of the term "Oil Sands" for this company.

Switching to more modern times that more closely tracks the development these competing terms in the era of commercial production and the massive increase of published literature, the ISI Web of Science database provides bibliometric data (e.g. frequency of citation, citation index, etc.), within the arena of peer-reviewed scientific journals. This database does not incorporate books, government reports, and abstracts, as part of its database, but it traces the huge shift in preferred academic citations-of-record toward peer-reviewed articles and away from monographs— a trend that became accentuated particularly after 1996. The ISI is now the most widely used cross-disciplinary database for peer-reviewed scientific literature for the past decade.

A Boolean search of the ISI database yielded some structure of evolution in frequency, but not context, in which "tar sands" versus "oil sands" appears in the technical literature. Working backward from the present to the opening of the Suncor plant, the following trend appears: no fewer than 30 science research and review articles (not policy articles) occur in which the western Canadian petroleum reserves were referred to as "tar sands", exclusive of the term "oil sands", between 2009 and 2013. A search for the term "oil sands" in the same context yielded about 3 times as many citations over the same 3-year period. Over the period ranging from 2000-2008, "oil sands" is used about 10 times more than "tar sands" in scientific articles. For the decade 1990-2000, "oil sands" was used about 5 times more frequently, and for the decade 1980-1990, "oil sands" was used 3 times more frequently than "tar sands". Prior to 1980, references to either terms are rare. The bibliometric analysis of this trend shows that:

1. The term "tar sands", though in the minority compared with "oil sands", is rebounding in use compared to "oil sands" over the past 3 year period to ratios used in the first decade when both terms began to appear in the peer-reviewed scientific literature in reference to the western Canadian reserves.
2. Both terms appear in articles that would seem to target extraction industry readership versus those that target environmental readership. Neither term seems to be the particular domain of either readership targets, at least among scientific journals.
3. Editors of individual journals of record may differ (and some dogmatically so) about what is 'proper', but clearly both are still in use, both are accepted in the literature writ large, and both are perfectly acceptable scientific terms.

As a last note, the US Federal Code does not belabor the distinction between "tar sands", "bituminous sands" and "oil sands". Indeed the only appearance with regard to transport and storage of this material is in the 'definitions' section of 40 CFR 80 Subpart

Kb §60.111b, which states simply that,

*Petroleum* means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal.

The term "oil sands" is absent in Federal Code.

The upshot is that "tar sands" was not a term adopted by environmental groups to bring "oil sands" into disrepute. Rather, it appears that Suncor, through its former name "Great Canadian Oil Sands", played a key role in transferring an older use of the term to upgrade in nomenclature its materially upgraded "tar sands".