

Be Not Afraid of Greatness
or
Sudbury: A Cosmic Accident

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Sudbury is not ugly, as the old “moonscape” slur has it, nor is it beautiful, as its boosters claim, pointing to the city’s many lakes. At once awesome and terrible, harsh and majestic, Sudbury lies beyond the register of ugly and beautiful. The place can only be described as sublime, for Sudbury is a phenomenon as much as it is a city. This status is revealed by the fundamental confusion about its name, which never makes clear what is nominated: the city itself, the larger region, the Sudbury Basin on which the city is perched, the fact of the mines, or even the reputation of the place. Without proper limits, one signifier encompasses all of these identities.

Sudbury is, in the final analysis, the slow unfolding of a cosmic accident. The nickel ore that fuelled the city’s development was deposited in a vast cataclysm, the impact of a meteorite that would have destroyed all life on earth – had there been any. But this occurred so long ago that life did not yet exist on earth. The shock was so great that seismologists can still faintly detect its reverberation –planet Earth literally quivers with the pangs of Sudbury’s birth. The impact also resonates metaphorically in uncanny returns that recall the traumatic genesis of the place. The most obvious example is the way that the mining of Sudbury’s extraterrestrial gift denuded a vast area of land – the ring of blasted and blackened rock seems to reiterate the original collision’s destructive effects. Likewise, the open-pit mines, once used where the ore breached the surface but now long obsolete, seem to parody the original crater; and for decades, people stopped their cars along the highway for the nightly spectacle of molten slag being poured down a growing heap, as if watching a *son et lumière* show explaining how they happened to arrive here. The city and its fortunes, fair and foul, can be properly understood only by the measure of the awesome, the terrible, and the undeniably grand. Sudbury, however, did not achieve greatness; it had greatness thrust upon it immemorially, and now struggles with the fear of it. When the city formally changed its name



in 2001 to the awkward (and widely unpopular) City of Greater Sudbury/La Ville du Grand Sudbury, it was to officially acknowledge the amalgamation of the regional municipality, but symbolically, it declares something known to all who live here and immediately apparent to those who visit: Sudbury is no ordinary town.

An account of Sudbury is almost obliged to begin with its ancient origins, and some remarkable facts and figures. Geologists now generally agree that the Sudbury Basin was formed 1.85 billion years ago by the impact of a meteorite roughly ten to sixteen kilometres in diameter. The original crater was circular and about 240 kilometres wide. Material ejected by the collision spread in what must have been a global fire-storm; in 2007, a large patch of Sudbury detritus 7.6 metres thick was discovered in Minnesota, at a distance of some 1,100 kilometres. The force of the collision is incalculable; it left circular fractures called shatter cones that can still be seen in the rock, and caused changes even at the molecular level, forming microdiamonds and trapping rare elements in the rock. The Precambrian Shield was punctured so deeply – to a depth of at least fifteen kilometres – that it has not yet been learned whether the nickel found in Sudbury was present in the meteorite, or whether it was splashed up from the molten bowels of the earth. In either case, the impact formed bodies of ore in a ring that resembles the milk-drop coronet photographed by Harold Edgerton, but at a vast scale and embedded in solid rock. This geological structure is called the Nickel Irruptive, and is the world's largest deposit of nickel sulphide ore.

The geological time frame of this event is so immense as to be incomprehensible. When it occurred, the single earthly continent had not yet divided; the planet did not have an atmosphere as such; plants did not yet exist; Minnesota was not Minnesota. The infinitesimal movement of tectonic plates over eons squished the original circle into an ellipse, and erosion reduced the crater to a shallow basin sixty kilometres long and twenty-seven kilometres wide. The last glaciers scoured the crater and then filled it with a shallow lake. The clayish area inside the basin, a lacustrine plain known locally as “The Valley,” is now mostly farmland, and around the irruptive, which is sometimes called “The Rim,” the mines are strung in a loop. The valley renders plainly visible the disturbance that lies far below the ground, and, as a small patch of ag-



ricultural land within the stony uniformity of the Canadian Shield, it has the almost mythic quality of those lost valleys in science-fiction tales where time stands still and a fragment of a prior world is preserved. To crest the rim of the irruptive and descend to the flat plain of the valley can produce a strange thrill, as if one were riding the infinitely slow roller coaster of pre-history.

The catastrophic destruction of the natural environment is the other inescapable fact of this place, and it is the part for which we are responsible. Until the beginning of a remarkably successful programme of landscape remediation in the early 1970s, the city of Sudbury was surrounded by a zone about ten kilometres in diameter that was denuded of vegetation, badly eroded, and stained black by the sulphuric acid released by the smelting of nickel ore. Biological processes broke down so completely that there were no insects or fungi to help rot the few remaining tree stumps. At the centre of this forbidding zone, there was, and still is, an extensive and growing heap of slag and large ponds of fine tailings. This eerie landscape had the aspect of a biblical *tel olam* – a desert or damned place. In the early seventies, the trip into the city entailed crossing through this weird landscape of black rock interspersed with alluvial plains of tailings stained bright red and traversed by brilliant cupric blue streams with banks of yellow sulphur crystals. It was like commuting on some other planet.

Much of the environmental damage was done by open-bed roasting, a practice that seems almost unbelievable now that it is obsolete. The pentlandite or iron-nickel sulphide ores found in Sudbury contain as much as 25 per cent sulphur, and this level must be reduced as the first step in smelting. From the beginning of smelting in 1888 until new practices were adopted in 1929, at least eleven roast yards with a total of up to 65 beds were used in the initial processing of the ore. The primitive procedure consisted essentially of building a wood pyre the size of a city block and up to a couple of metres tall. Pulverized ore was piled on top and the whole mass ignited. The roasting lasted from 35 to 40 days for an 800–1,000-ton heap, and could run well beyond a hundred days for a heap of 2,500 tons. The wood was simply tinder to ignite the ore itself. The success of the procedure relied on the fact that the ore found in Sudbury is chemically “hot” and can ignite at a relatively low temperature. This process, however, had the effect of releas-



ing sulphur dioxide directly into the air, where it combined with atmospheric water to make sulphuric acid. The four decades from 1890 to 1930 saw an estimated 11.2 million tons of sulphur released into the immediate environment at ground level. Although the enclosed smelting process that was later implemented was less dramatic, it released even more sulphur into the air until the fumes began to be regulated in the early 1960s. Exactly how much heavy-metal particulate was released is still debated, and it could yet prove to be a significant long-term health threat. The Superstack, completed in 1972, was the last major effort to ameliorate emissions by the traditional expedient of dispersing them. Today, almost all of the sulphur removed from the ore is sequestered, rendered into a solid form, and used to backfill the underground excavations. Huge areas of the damaged landscape have been dramatically restored through the relatively simple method of spreading limestone on the soil to neutralize the acid and planting wild grasses and trees. Sudburians are justifiably proud of their efforts to reverse the environmental damage, but the city remains the site of one of the most extensive and extreme episodes of environmental pollution in the modern era. This legacy is literally etched into the rock in Sudbury, which is not naturally black, but, rather, mostly a pale blue-grey colour.

Mining could be said in general to encourage the tendency to view all of nature as a standing reserve, and despite the Herculean effort required to extract minerals, they trigger the phantasy of unearned wealth. This greed has a brutalizing effect on society, and generates a culture quite distinct from the dignity of (traditional) agriculture or the inherent civility of manufacturing. For much of its past, and particularly in the 1970s, Sudbury was dominated by a “haywire” sensibility that comprised audacious improvisation, utter disregard for appearances, sheer expedience, and untrammelled force. Profoundly anti-urban, this callous attitude was a unique local development of the pioneer/survivalist impulse that runs throughout the North, and it both fed off of and perpetuated a debilitating sense of impermanence. Work in the mines was hard but lucrative, and Sudbury was regarded by strong and uneducated young men as a place to make a quick start in life. It was understood to be a way station, not a terminus, sometimes even by those who spent their whole lives here. Until the 1960s, “pack-sack miners,” so named for their mobility and minimal possessions, still lived in bunkhouses and ate at Crawley McCracken’s industrial canteen;



new immigrants, if they were big men and worked hard, could labour without speaking English. The material rewards of mining made Sudbury's working class the most affluent in Canada, but the life also required a good measure of fatalism, given the staggering rate of industrial accidents.

The story of the discovery of nickel in Sudbury need not be recounted here, but it is worth noting that the city actually originated not as a mine site, but as the junction point of two railroads, and it began as a logging camp. The early extraction of nickel in Sudbury occurred alongside developments in metallurgy that rendered nickel useful and valuable. When German miners in the early eighteenth century found copper ore mixed with an unknown whitish metal, they called it *kupfernickel*, or Old Nick's copper, because it was very difficult to smelt. Nickel was identified as an element in 1751 by the Swedish chemist Axel Fredrik Cronstedt, but the metal's capacity to render steel resistant to corrosion was only developed late in the nineteenth century and not perfected until the First World War.

Along with chrome, the addition of nickel transforms steel from a material that practically bleeds with oxidization into stainless steel, a cool, impervious substance that is emblematic of the modern era. Stainless steel is steel's alter ego: tough, aloof, glamorous, and faintly menacing. Because stainless steel is not a coating, it is not perceived as superficial, and thus stands as the antithesis of chrome plating. In this improved amalgam, steel takes a high polish and has a glint that suggests an almost theoretical material, one comparable only to gold in its resistance to tarnishing, but infinitely more useful. Stainless steel responds to the human interest in eternity and immutability, and it advances the aim of resisting environmental conditions and the inevitability of entropy. Hard, masculine and futuristic, almost fascistic in its appeal, it is the stuff of machines and weapons and robots. It is the Clint Eastwood of materials, unfuckwithable.

Sudburians might object to this admittedly extreme description of nickel's aura, but they naturally have some awareness of nickel's strategic role in the modern world. Most probably know that nickel is used to harden steel for armour and munitions, not least because Sudbury has tended to flourish conspicuously in times of war. This prosperity is



not without its psychic consequences. In the paranoid context of the Cold War, Sudbury was commonly assumed to be a priority target for Soviet nuclear weapons, an assumption that was widely reinforced by the discovery of significant uranium deposits in nearby Elliot Lake. The bombings of Hiroshima and Nagasaki had an uneasy resonance in Sudbury, where the landscape already appeared to have suffered a megacatastrophe. When the North American populace began to express its postwar anxieties about nuclear annihilation in popular culture and films, the nuclear threat fused with the idea of Earth's collision with an asteroid, and Sudbury somehow condensed all of these dystopian imaginings into one barren and inhospitable place.

The legacy of Sudbury's harsh beginnings is indelibly stamped into the city, its communities, and the landscape. Many profound changes have occurred in Sudbury's culture in the last two or three decades and its economy has been transformed, but the effects of its past remain. Many industrial towns have been gentrified by simply transforming the local mill into a tourist site or, increasingly, loft condominiums, but Sudbury cannot change its face so easily, even if it wanted it to. For better or worse, cultural amnesia is not an option here. Mining linked Sudbury's fate to resource extraction, and thus to capitalism in its most direct form. In his role as an industrial safety inspector for the Habsburg Empire, the writer Franz Kafka identified mining and metallurgy as the "primary large-scale enterprises of the pre-mechanical era." Sinking shafts into the earth to access bodies of ore requires so much capital that mining led the emergence of capitalism from the guilds and restricted economies of the Middle Ages; many an early Renaissance fortune was built on the joint foundations of mining and banking, and resource extraction was often the motive for exploration of the New World.

Sudbury's development displays some of these features in their later, more advanced forms. The "I" in Inco's name proclaimed the venture international, but the dominant company in the exploitation of Sudbury's ore reserves was essentially American. Inco may nominally have been based in Toronto, but Canada's role in this relationship was at best that of junior partner in a kind of corporate suzerainty. Falconbridge, the younger and smaller corporation in Sudbury, generally enjoyed a better reputation than Inco, but it was not entirely different. In



fact, the rivalry between Inco and Falconbridge over the course of the twentieth century often had the unreal air of a binopoly – the minimum diversity required to maintain the appearance of open competition, while colluding for the same ends. In the last decade, Inco and Falconbridge were purchased, respectively, by the giant mining corporations Vale, from Brazil, and Xstrata, from Switzerland. This situation is still regarded (not without some degree of xenophobia) as abnormal, but the truth is that Sudbury has never really ruled itself.

Understandably, diversification has been Sudbury's cultural and economic mandate in recent decades. Fuelled by the North's long-standing regionalist grievances, the city went through a phase of public investment that resulted in the creation of the Taxation Data Centre, Science North and improved health-care and educational facilities, but there are now signs that vigorous private initiative is rising from the thrall of the mines, and doing so in Sudbury's own inimitable way. The usual process of industrial formation starts with small workshops and, by a process of consolidation, arrives at big industrial enterprises. In Sudbury, manufacturing has followed a different course. Its impetus – the movement by the major mining corporations to outsource services, which provided the initial contracts on which to establish small businesses – came late. But in order for these mining-service companies to grow, and to protect themselves from the effects of periodic strikes, they needed to cultivate new markets and therefore sought either to diversify or to specialize. More than four hundred new businesses have thus developed in the last few decades.

These new ventures have had a stabilizing effect on the local economy and have greatly increased local industrial-design and engineering capacities. There has, however, been a lag in conceptually assimilating this new phenomenon; the established image of the city is of rugged hardrock mining and labour conflict, while the new reality is one of progressive investment in high-tech manufacturing and services, designed to circulate globally along the distinct trade lines established by mining. Mining's unique spatial network is tied to places usually far removed from the centres of global finance. In Sudbury, one meets specialized workers – from diamond drillers to geo-tech surveyors – who have worked in such diverse places as Kazakhstan, Chile, Norway, Indonesia, Sardinia, Utah, Micronesia, and the Dominican Republic.



This, obviously, is not the list of finance, software, and biotech cities canonized by urban theorists such as David Harvey, Saskia Sassen, and Richard Florida. Minerals have their own map, and mining fosters what could be called geo-cosmopolitanism, a network governed by the wealth below the ground and only secondarily concerned with problems of access and distribution.

Sudbury's distinct form of globalization is thus a holdout from an era when production dominated distribution as an economic concern. Although an improvement over the "haywire" approach, the geo-cosmopolitan sensibility does not necessarily possess the positive cultural attributes of other forms of cosmopolitanism, and it certainly does not correspond to urban sophistication. Instead, it is predicated on an intense local identity, which is often at odds with political reality. Nevertheless, it would be unthinkable for a city of Sudbury's scale and level of development to exist at most mining sites. Traditionally, mining companies were forced to be self-reliant to a remarkable degree, but because Sudbury was initially founded as a logging town at the junction of two railway lines, it had greater accessibility than most from the start. This is the key to the city's continued growth and current relative prosperity. The [fact of the] city's permanence testifies to the extraordinary size of the mineral reserves here, but it is transportation that sustains the place. (Perhaps this is why Sudburians are so intensely interested in the state of roads.) Be that as it may, Sudbury might just prove to be the rare case of a mining camp outliving the resources on which it was founded to become a city with its own internal dynamic.

Now that the city is emerging from the grip of mining, it is tempting to retroactively consider nickel Sudbury's *damnosa hereditas*, the boon that eventually reveals itself as blight. But for all the deficiency of its urban culture, Sudbury is graced with an unusually well-developed urban core. Though small, in part because half of the available area is occupied with rail yards, the core has a full matrix of streets and lanes, making it a significantly more advanced urban form than such main-street towns as Kitchener or Waterloo, despite their much larger populations. Ultimately, however, the limitations of Sudbury's site led to the construction of New Sudbury and the resulting bifurcation of the city after the Second World War. The constraints on land available for de-



velopment are, in part, the result of a peculiar legislative history too complex to explain here, but they are primarily a result of the landscape, which really provides no adequate place on which to build a city. Sudbury's builders have always faced the Scylla of steep, rocky hills and the Charybdis of swamps and muskeg. Though poorly drained, the sparse areas of flat land took little effort to clear, and thus developed as the city's earliest neighbourhoods. The wealthy and powerful, however, favoured living on the shores of Sudbury's lakes, even if it meant building private roads or locating on the city's hilltops. In Sudbury, topography corresponds quite closely to class, but the "Mansion on the Hill" about which Bruce Springsteen so plaintively sings has now become a mass phenomenon. Several conventional suburban communities have been recently blasted into the top of rocky hills – a case of local skills facilitating a normative vision of dwelling that is at odds with the facts of the ground.

Actually, the city has numerous features that defy all expectations of both urban and natural form. Maki Avenue, an elite residential street, is a fascinating example of the confusion of nature and culture in Sudbury. Built on a peninsula that extends almost a kilometre into Lake Nehpawan, it appears to be a perfectly ordinary suburban street, except that every house on both sides overlooks water. The Kingsway, where the banal melds with the fantastic, is another example. At first glance, it appears to be an absolutely typical North American commercial strip; it is more or less level and straight, and lined with fast-food restaurants and strip malls. Yet, just behind the parking lots are walls of rock carved out by blasting. Car dealerships cluster in this channel of partly natural, partly fabricated space, defying the logic of their usual association with wide-open lots at the edge of town. Recently, a district of big-box retail stores was built on a stone plateau where Barry Down Road intersects the Kingsway, demonstrating the power of new retail models to overcome the most forbidding technical problems of development.

Sudbury's oddity is also manifest at a regional level. A unique spatial macro-form developed as a result of the crater's shape and size. Instead of the concentric pattern that many cities assume, Sudbury acquired a series of satellite settlements located at or near the site of bodies of ore on the Nickel Irruption. This elliptical ring of towns relies on Sudbury for social services, entertainment, etc., but instead of moving into the



city's centre in the classic North American pattern, many workers moved outward from dormitory communities built just inside the valley to the mine sites. In fact, Sudbury proper is not, in a physical sense, the centre of this system, as it is also located on the periphery of the ring. This unusual structure established a powerful dialectic of "the city" and "the valley," and it has had numerous consequences for the social and even political order of the city. In the outlying communities, it instilled a stronger independence than is usual in suburbs, but in order to govern these towns effectively, Sudbury was established as a regional municipality in 1973 and, in 2001, all of the towns were amalgamated into the City of Greater Sudbury. This political manoeuvre has by no means, however, resolved the opposition between the two forces.

The foregoing comments may make it seem that Sudbury somehow dwells in the past, but that is not the case at all. Northern Ontario is fundamentally modern, and Sudbury even has a decidedly futuristic aspect – as seen, for example, in Thomas Alva Edison's brief involvement in developing the mines, in the presence of Science North, and most recently, in the Sudbury Neutrino Observatory (SNOLAB). The SNOLAB is one of the city's many invisible presences; perhaps only a few hundred people have ever been inside it, yet it holds a special place in the collective imagination of Sudburians. Located at the 6,800-foot level of Inco's Creighton mine, SNO is the deepest underground observatory currently in use. Now the site of many long-term physics experiments, it was inaugurated with a geodesic sphere made of acrylic and stainless steel, and suspended in a ten-storey, water-filled cavern cut directly into the rock. This giant vessel contained 1,000 tonnes of heavy water, and it was lined with hyper-sensitive detection panels. The earth's mantle shields the observatory from random cosmic particles, allowing only neutrinos to penetrate it. Curiously, the inversion of an observatory located deep underground mirrors the inversion of a detector for evanescent neutrinos located at the site of a massive meteor's impact.

Sudbury abounds in signs and traces of its extraterrestrial origins, from the nickel itself, a metal commonly found on meteorites, to shatter cones produced in the rock by the force of the collision and even traces of fullerene. The Onaping Formation, a black tuff on the northern edge of the irruptive, was the first confirmed deposit of naturally occurring



fullerene, a form of carbon with sixty or seventy atoms arranged in a sphere, that was discovered only in 1985. The carbon may have been present in that form on the meteorite, or it may have been synthesized on impact, but no one knows exactly how it was preserved for nearly two billion years. Even more recently, it has been discovered that these spherical molecules, like miniature prisons, contain astral gases. Asteroids are known to sometimes contain amino acids, which has led some to speculate that collisions with asteroids may have seeded the earth with the chemicals necessary to initiate life, or may even have brought life itself to earth. Later impacts caused death and destruction, but the Sudbury impact occurred near the time of the origins of life on earth. As Sudbury-born artist Paul Lamothe says, Sudbury may be the spark that ignited the primal ooze.

It makes perfect sense that the geodesic sphere of the SNOLAB, located deep in the earth, replicates the structure of fullerene, and that scientists now search for minute cosmic particles in the aftermath of the immense meteorite that shaped Sudbury. It is a place where telluric forces are felt with particular intensity, but where their connection to the astral plane is also evident. The infernal patina on the rock sometimes makes it look as if the darkness in the depths of the mines has escaped onto the surface, where it can be seen in broad daylight. Nickel was named after the devil himself, so it is quite appropriate that Sudbury have a whiff of the infernal. Life in Sudbury has an apocalyptic quality, as if one lives at ground zero, but two billions years after an absolute event.

Sudbury magnetic – lode-stone.