## The Scenic Geology of Calgary – A Walk at Nose Hill

## Nose Hill – so much geology to be seen

Nose Hill Park is one of the best places to appreciate the geology of Calgary. The park overlooks the city and surrounding area, providing panoramic overviews in all directions. The Bow River valley is several kilometres wide and 200 metres deep, with a complicated geological history. The Rocky Mountains dominate the horizon to the west and the Plains stretch into the distance to the north, east and southeast.

## Directions

Nose Hill Park and the associated hikes are best accessed from two locations. For the best overviews of the Bow River valley, the Rocky Mountains to the west, and to picture the glaciations and Glacial Lake Calgary, park at Edgemont Boulevard parking lot at the intersection of Shaganappi Trail and Edgemont Boulevard. A second location for an overview and to access the glacial erratic, park at the 64th Avenue parking lot, at the intersection of 14 Street NW and 64 Avenue.



Use the figure below as a reference to the Scenic Geology of Calgary, as viewed from Nose Hill.



- Meandering river sands and floodplain mudstones of the Paleocene Porcupine Hills Formation extend down about 600 metres below the city. These ancient rivers flowed into Alberta during the last mountain-building phase of the Rocky Mountains 62.5 to 58.5 million years ago. Sediment originated from the ancestral Rocky Mountains at the time.
- Mountain building ended about 65 to 60 million years ago.
- Since then, there has been regional uplift and erosion. There has been 1.7 to 2 kilometres of sediment eroded in the Calgary area, seven kilometres in Banff National Park, and twenty kilometres in Yoho National Park. The Rocky Mountains that we see today took their present shape due to differential erosion over the last sixty million years or so.
- A regional high-plains erosion surface developed across the prairies on which large boulder gravel was deposited. The gravels were eroded from the rising and eroding Rocky Mountains. The tops of Nose Hill and Signal Hill are remnants of that vast river plain that covered much or western Alberta at some point before the continental glaciations.
- Glaciation occurred several times in Canada over the last 2.6 million years. Calgary though, was not glaciated until the Late Wisconsinan ~ 22,000 years

ago. During this glacial episode, ice sheets came and went from the mountains in the west and from the Canadian Shield in the north.

- The first glaciation from the Rocky Mountains extended down the Bow River Valley from Banff. The glacier extended east of Calgary to merge with and be deflected southwards by the Laurentide Ice Sheet.
- The Cordilleran glacier that flowed down the Bow River valley melted back towards the mountains, depositing the irregular relief hummocky terrain at Spy Hill.
- Laurentide Ice Sheet advanced eastwards to Cochrane. This massive ice body receded and advanced several times in the Calgary area. Up to 1.5 kilometres of glacier ice may have covered Calgary.
- Large quartzite blocks and boulders scattered across Nose Hill are part of the Foothills Erratics Train that originated from landslides onto a valley glacier at Mount Edith Cavell in Jasper National Park. The glacier flowed north, out of Jasper to merge with, and be deflected by the Laurentide Ice Sheet, carrying the blocks as far south as Montana.
- The Laurentide Ice Sheet acted as a dam across the Bow River and Elbow River valleys. Melt water from the retreating ice was dammed by the glacier to form Glacial Lake Calgary that extended as far west as Cochrane.



• Lake levels varied as the ice sheet melted and re-advanced depositing lake bottom silts and clays on which the communities of Brentwood, Varsity, and Silver Springs. The Foothills and Children's hospitals are built on the sediments of this glacial lake bottom. Glacial Lake Calgary was nearly as high as where John Laurie is today.



Geology Building was under ~40 m of lake water



- The glaciers melted, creating spillways and melt water channels at several locations in Calgary. Calgary and the Bow River valley became ice-free by about 16,500 years ago.
- The Bow River Valley cuts down to its current position and takes its present form.
- As you explore Nose Hill Park, examine the boulders along the paths. The large well-rounded quartzite boulders are from the high-plains boulder gravel capping Nose Hill, deposited by powerful braided rivers flowing from the west. The large angular, white to pink boulders and blocks scattered on the surface are part of

the Foothills Erratic Train that originated from Mount Edith Cavell in Jasper National Park. Angular dark pink and black boulders were deposited in the glacial till of the Laurentide Ice Sheet.



Alberta's landscape gems have been sculpted by long-past geological events such as these. Put on your hiking boots and fill your car with gas. It is time to explore and learn how Alberta's most scenic sites were created.

Dale Leckie, Ph.D., P.Geol., is an author and geologist. His second tour book *The Scenic Geology of Alberta: A Roadside Touring and Hiking Guide* encourages Albertans to explore their province. Follow Dale on Twitter @DaleALeckie and at <u>https://brokenpoplars.ca</u>

