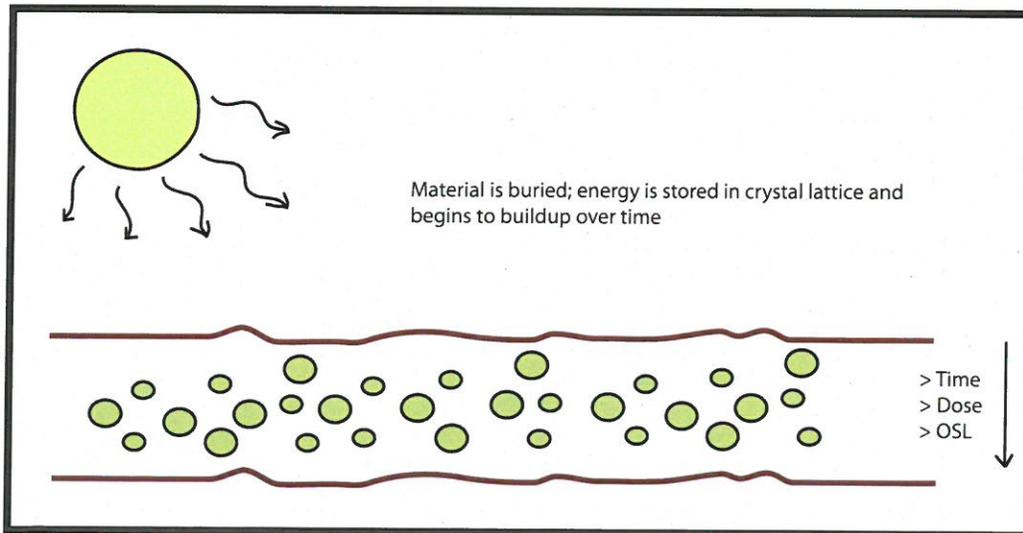
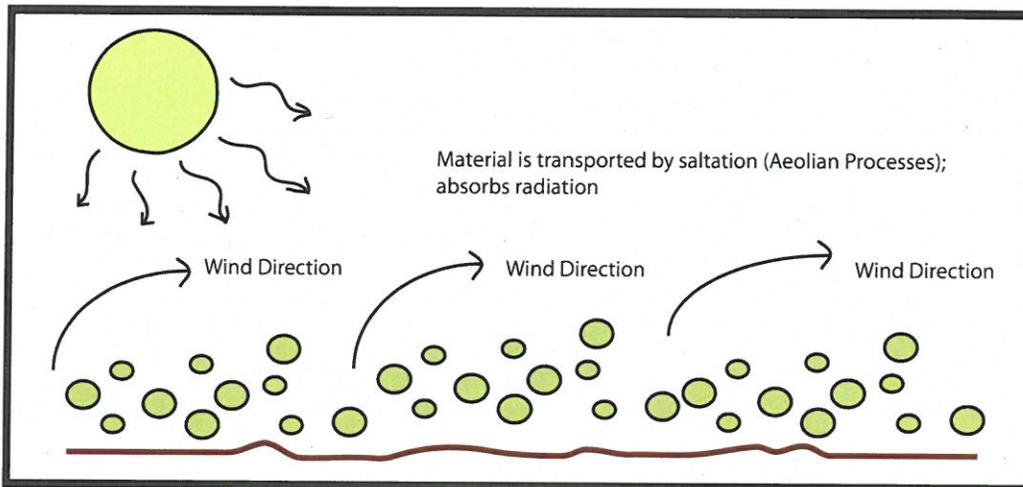


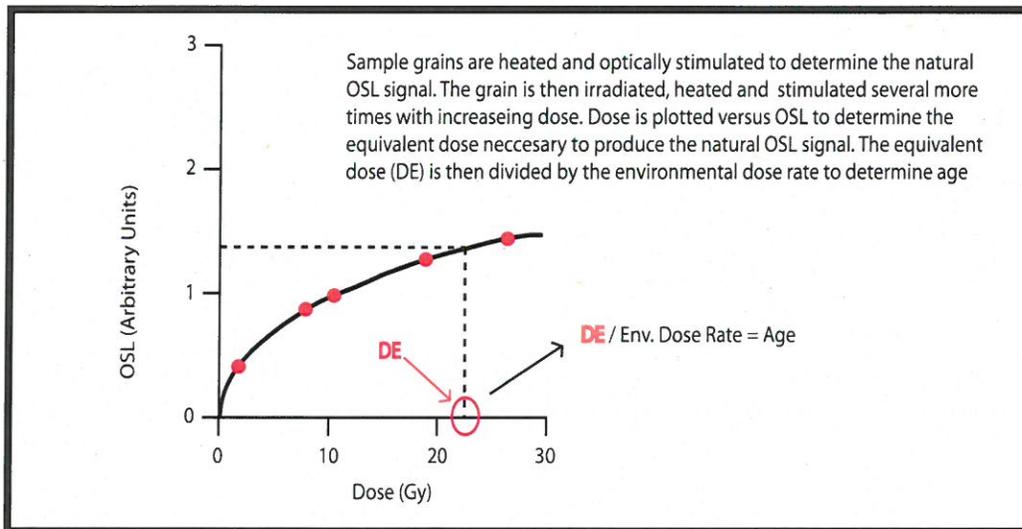
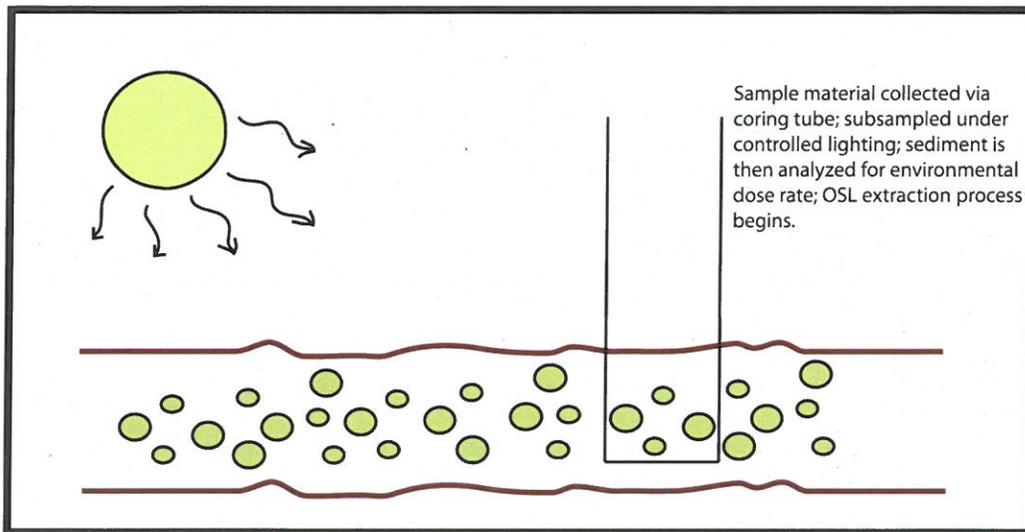
**Brief Summary of work done on a Pine Bush Dune**

**Optically Stimulated Luminescence (OSL) Dating** OSL is a relatively new method of “trapped charge” dating. OSL works on the principle that upon burial, sediments are constantly exposed to low levels of internal, external, and cosmic radiation. This radiation causes free electrons from naturally occurring isotopes to be excited from the lower energy valence band to the higher energy conduction band. However, some electrons get “trapped” between these two energy levels in defects in the crystal structure. The longer the deposit is buried, the more electrons accumulate in traps. Exposure to a small amount of energy, such as sunlight, frees trapped charges and releases the extra energy as photons. The quantity of released photons (the luminescence signal) can be measured in a laboratory and used to determine the date of deposition or more contextually, the time since the most recent burial of quartz and feldspar grains. *See series of figures below.*

*Project Application* - By obtaining OSL samples from both the top (crest) and bottom of the dune, a constrained time interval of dune formation can be inferred.



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**Comments on the OSL results of the 09-PB (Pine Bush Preserve) dune.**

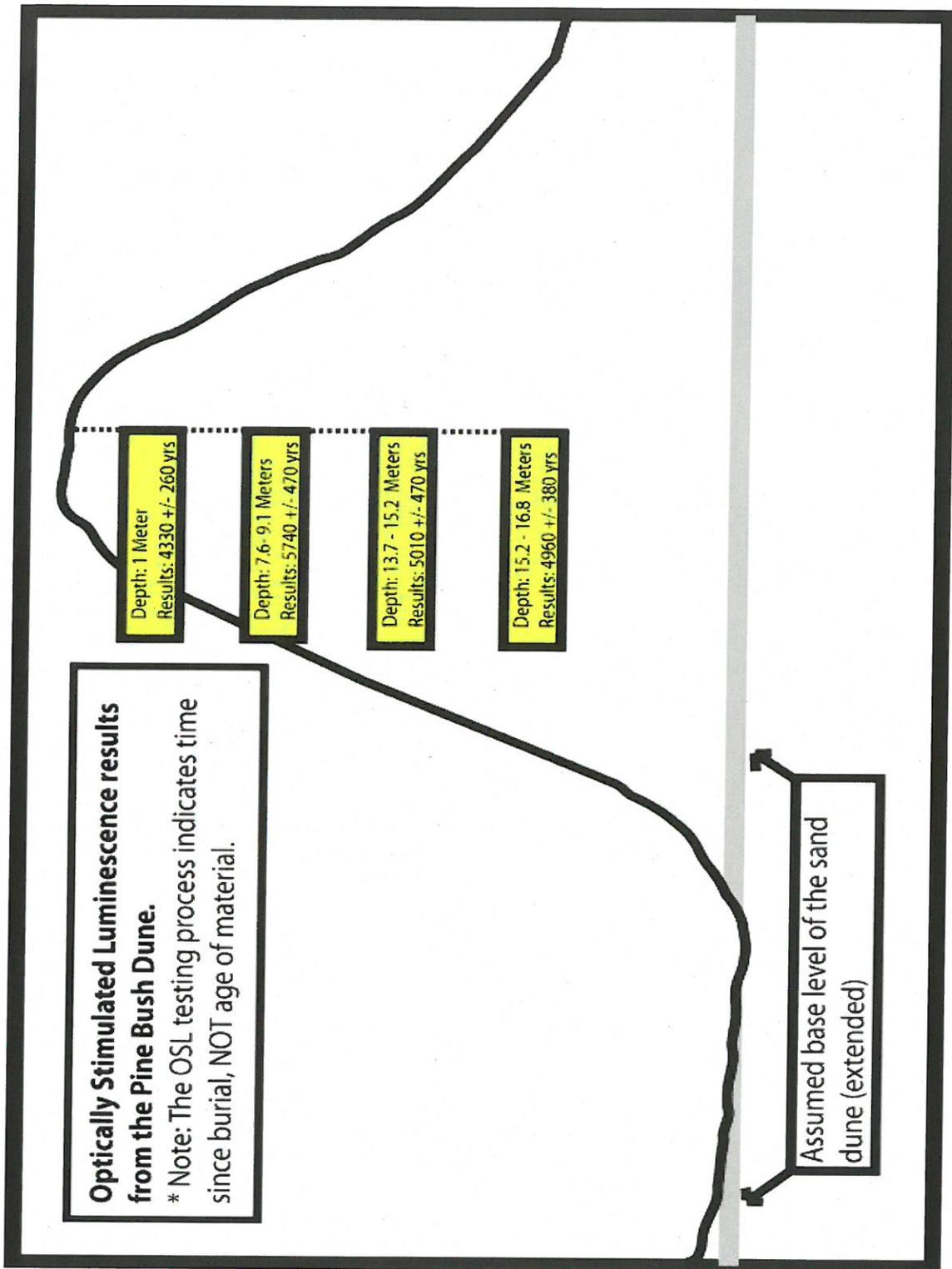
Initially, the OSL results for 09-PB (Table 1) presented an interesting problem. The complete reversal of what is expected of an age/depth relationship, although surprising, can be explained after expanding on what is known about OSL. Getting an accurate OSL age is dependent on whether or not the quartz grain's luminescence, or amount of absorbed radiation, has been "re-set". In other words, the grain retains a certain amount of radioactivity and that radioactivity is constantly being reduced and replenished...as long as the grain is exposed to a light source (in most cases, sunlight). Research tells us that the reduction of radioactivity happens at a greater

rate (< 10secs = 80% - 90% reduction) than replenishment (dependent on light availability and environmental conditions). Rapid depositional events (burial, transport into a sub-aqueous situation) can impede the absorption of radioactivity to a point where the grain's luminescence "tank" doesn't get refilled (re-set). This partial refilling leads to a younger age since burial (OSL result). This could explain the younger than expected age chronology for 09-PB. There may have been a rapid deposition of the overlying material caused by a surge in the prevailing wind velocity which in turn increased the rate of dune progression. Also, one or two of the resultant ages could be accurate with the second or third being affected by situations as described above, thus giving an inverted chronology. Further research is needed in order to better determine the reasons for the OSL results.

**Preliminary OSL Results on all dunes sampled**

<b>Site Name</b>	<b>Sample Depth (below crest of dune)</b>	<b>Calculated time since burial (cal. yrs. BP)</b>
09-DE	1 meter - top of dune	6950 +/- 450
09-DE	7.6 – 9.1 meters – base of dune	9320 +/- 590
09-DE	9.1 – 10.7 meters – base of dune	8530 +/- 500
09-EG	1 meter - top of dune	6450 +/- 420
09-EG	7.6 – 9.1 meters – base of dune	10520 +/- 600
09-EG	3.0 – 4.6 meters – assumed midpoint of dune form	5140 +/- 590
09- PHC	1 meter - top of dune	6540 +/- 460
09-SM	1 meter - top of dune	6910 +/- 490
09-PB**	1 meter - top of dune	4330 +/- 260
09-PB**	7.6 – 9.1 meters	5740 +/- 470
09-PB**	13.7 – 15.2 meters	5010 +/- 470
09-PB**	15.2 – 16.8 meters	4960 +/- 380

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Cross Section of 09-PB showing relative sample depths and results. \*Note: Not to scale.

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