Summary and Synthesis of Specific Reviewer Comments from ESRL Review

ESRL Atmospheric Chemistry Review: General Comments

Clearly the ESRL's Atmospheric Chemistry Research has an outstanding and exceptionally productive scientific staff that has contributed to a greatly improved scientific understanding of important environmental issues, including stratospheric ozone, air quality, and climatically important gases and aerosols. Several ESRL atmospheric chemistry scientists are recognized internationally as being among the most talented and respected of the world wide scientific community addressing these important societal issues. In addition to their high scientific research productivity, these scientists have also played a major (perhaps even a disproportionately large) role in major international efforts aimed at developing policy-relevant scientific assessments of these issues (e.g., IPCC and stratospheric ozone). Another major contribution of the ESRL Atmospheric Chemistry research includes the international leadership role it has played in the calibration and standardization of the global efforts to document the changing nature of the atmospheric composition.

With respect to the requested evaluation topics, reviewer input was essentially unanimous and consistent across all the groups evaluated.

Quality: ESRL's atmospheric chemistry researchers constitute one of the top atmospheric chemical sciences groups in the US and rank among the very best in the world. The overall quality of the atmospheric chemistry science being conducted at ESRL is outstanding in most respects.

Relevance: The ESRL atmospheric chemistry research activities were also judged to be especially relevant to both national an international environmental priority areas of importance to society. They have played a leading role nationally and internationally in documenting and understanding climate change, stratospheric ozone, and local and regional air quality.

Performance: The scientific leadership and planning is outstanding and has been a hallmark of this group for the last three decades. The performance of the ESRL atmospheric chemistry scientific staff has been outstanding and has provided many major scientific contributions for major national and international assessments that are of use to society and policy makers around the world. All in all, ESRL's atmospheric chemistry research is a remarkably effective and efficient, although the efficiency of the effort would be improved with increased technical, engineering and IT support staff. This effectiveness might also be increased if it were better linked to the fuller set of NOAA research (see item two below).

There are two major issues of concern that reviewers identified that seem to be common to the various groups within ESRL atmospheric chemistry. The first is the observation that the demographics of the scientific staff is skewed perhaps too much toward senior

personnel, and this raises the question of whether of not ESRL will be able to maintain the exceptional scientific and leadership quality and reputation for excellence in the longer term. The second deals with the relationship of ESRL atmospheric chemistry with other related NOAA activities both internal and external to OAR.

The issue of demographics concerns the health and durability of the scientific work force in ESRL's atmospheric chemistry activities. This group has a number of extraordinarily talented scientists that are recognized around the world for their scientific productivity and creativity. However, this is reflected in mostly the more senior staff of the laboratory with a number of these individuals now at a mature stage of their career with many now (or soon will be) eligible to retire. A common observation in the discussions and individual reviews comments was a concern that there may be an inadequate infusion of highly talented younger scientists to ensure the maintenance of the scientific stature of the ESRL chemical sciences research in future years. It is recognized that new or open positions have been tight and management is limited in what can be done to obtain this new talent. This problem is addressed somewhat through the use of non-government positions in CIRES, however, the very brightest and most desirable young scientists are opting for positions in academia or other government labs when it appears there may not be a position in ESRL in the near future.

A somewhat related point, as mentioned above, concerns the availability of technical support (i.e., technicians, engineers, IT, etc.) for the different scientific groups. In several cases it appeared that the scientific leaders had to spend more time than desirable on activities that could be handled by technical support staff. This means that there is less time for the scientists to spend on the more scientifically challenging issues being addressed by the ESRL atmospheric chemistry scientists.

A second concern that was common to the activities being reviewed was the nature of the relationship of the ESRL atmospheric chemistry research to other NOAA groups both internal and external to OAR. It was clear in some cases that very effective partnerships are at play with international and other agency organizations but reviewers felt that it was not clear how effectively ESRL interacted with other NOAA groups doing related and complimentary work. This may simply be the result of an oversight in preparing the materials for distribution and the presentations, but the near total lack of attention to this subject was of significant concern to the reviewers. This is an issue that should be explicitly addressed by both ESRL and the review panel in future evaluations.

In summary, ESRL atmospheric chemistry research is one of the crown jewels in NOAA and the nation in addressing several of the most pressing environmental issues facing the country and world today. NOAA and OAR management should do every thing possible to maintain the position of prominence that it currently enjoys. Possibly the two most important are to allow the recruitment and retention of young new ESRL staff that will become its future scientific leaders and to be able to demonstrate the value of ESRL's research to a broad range of NOAA's activities.

Reviewer comments made for the individual ESRL atmospheric chemistry topic areas are as follows:

Stratospheric Ozone

- Overall, numerous comments made about the strength of the group, its connection to the WMO/UNEP and IPCC assessments, and their unique roles within the US for measurement (e.g., Dobson 83, ozonesondes, Brewers).

- Concern that the leadership that the group has had, especially in international assessments, could be threatened in the longer-term future, especially given staffing concerns.

- The tie to the rest of NOAA was not well described in the briefings.

- One reviewer expressed concern that the ozone-depleting substance (ODS)/substitutes environmental acceptability research did not seem to be an obvious responsibility for the federal government (as opposed to, say, the industry that is looking to sell these compounds).

- The work that was done demonstrating the importance of ODS reduction in reducing what would otherwise have been significant radiative forcing is impressive.

- The collaboration with NASA has been very effective, but the group should look to build additional connections.

Carbon Dioxide, Methane, and Climate

- Significant positive comments made about the overall strength of the group, the devotion to accuracy and standards, the importance of their connection to global networks, and the appropriateness and innovative role of CarbonTracker.

- The work done by this group is very appropriate for a government laboratory.

- The reason for use of European Centre for Medium-Range Weather Forecasts (ECMWF) winds in Carbon Tracker (as opposed to winds from a NOAA-produced product) was not well explained.

- The connection to other activities, including those within NOAA and outside was not as well described as one might have expected.

- Some details of the measurement approach (e.g., rationale for measurement locations, any use of Observing System Simulation Experiments (OSSEs) to optimize measurement distribution) were not well spelled out.

- Initial emphasis on North America is sensible given constraints on the group.

- Group is respected for its productivity but concern was expressed about long-term adequacy of the staffing to sustain the level of performance, especially if there is a push to expand focus from North American to global.

Non-CO_2 Climate Gases

- Significant positive comments made about the overall strength of the group, the devotion to accuracy and standards, and the importance of their connection to global networks and assessments.

- Uniqueness of water vapor profile data set and the contribution they make to Southern Hemisphere Additional Ozonesondes (SHADOZ) were positively noted.

- Group's ability to work on multiple platforms (aircraft, unmanned aerial vehicles, balloon) is a strength, although care should be taken not to overly rely on Altair and to be able to articulate strategy for use of platforms (NOAA and other).

- The tie to the rest of NOAA was not well described.

- Concern was expressed about limited current staffing and the need to avoid any reductions that might be contemplated.

Regional Air Quality

- Significant positive comments made about the overall strength of the group, extensive analytical capabilities have been developed that allow high quality observational campaigns to be fielded.

- Good mix of field observations, laboratory studies and diagnostic modeling.

- Has apparently made important contributions to the assessment of emission inventories which suggest that there are still inadequacies that must be addressed to establish realistic regulatory policy, although there was no indications given as how this might relate to broader emissions inventories such as the International Global Atmospheric Chemistry (IGAC) Global Emissions Inventories Activity (GEIA) or EPA national emission inventory programs.

- In some cases there appears to be a lack of connection with other relevant groups, e.g. NOAA Air Resources Laboratory and National Weather Service, EPA, and in the case of ozone lidar development NASA laboratories.

- Concern was expressed about this group being stretched to thin and having aging scientific leadership.

Chemical Transformation and Long Range Transport

- Excellent staff with high quality efforts addressing issues using long term measurement, campaign style studies and laboratory evaluation of fundamental processes.

- The data generated by this group appears to very useful in several model development activities at ESRL and GFDL.

- There may be a need for improved coordination of atmospheric chemistry transport modeling activities with other NOAA units e.g. NWS, GFDL.

Aerosols and Climate

- Strong scientific staff that is carrying out different types of observational programs and instrumental development activities of high quality.

- Work appears to be a diffuse (but important) set of "aerosol" focused activities and while all are of high quality they seem to lack coherence and are pursued pretty much independent of each other.

- The surface observational monitoring program of the Direct Aerosol Forcing group has gone from almost non existent to the forefront of measuring aerosol optical and physical capabilities in the past several years.

- It may be productive to have additional connection and coordination of the surface aerosol observational programs of ESRL and the climate relevant space based observational programs.

- The effectiveness of the laboratory might be improved through the development of additional working relationships with additional climate modeling groups both within and external to NOAA.

- There was an expression of concern about the lack of new young talent coming into the group that would allow the future activities of the group to maintain an outstanding science program.